SCIENCE.

FRIDAY, NOVEMBER 26, 1886.

COMMENT AND CRITICISM.

WITH THIS ISSUE, *Science* offers to its readers an educational supplement, and a portion of the body of the paper is also given over to matters of educational interest. Hereafter this will be the case with every fourth number of the paper. These educational numbers will also be reprinted separately, and bound as an educational journal complete in itself, entitled *Science and education*. This will be furnished separately to teachers and others who may desire it and yet not feel able to subscribe for *Science* as a whole. The object in taking this step is to emphasize and elucidate the truth that education is a science, and teaching a profession. While adhering to no particular school of pedagogics, we believe that the present movement in favor of the scientific treatment of education is eminently proper, and we mean to aid it by all means in our power. As education, like civilization, is international, we shall endeavor to present to our readers from time to time an account of what is doing in Europe, and to inform them concerning current pedagogical literature, both American and foreign. We shall include articles on the history of education, the art of instruction, the science of education, classical study, industrial education, science-teaching, normal-school methods, school discipline, common-school questions, and cognate subjects. We hope to make our book-reviews especially useful to teachers and general readers, and to tell them what new books we consider useful to educational science, and what harmful. We propose to make this educational journal essential to teachers, and to educators generally, and to lend an efficient hand in aiding true educational progress.

THE VICE-CHANCELLORSHIP of the University of Oxford is the most influential office of the university, and the election to the position a great honor. Inasmuch as the vice-chancellor is the virtual executive officer, and enjoys many special prerogatives and privileges, his is a position of great influence and responsibility. Nominally the vice-chancellor is elected for a year; but if he is willing, and his health permits, he is re-elected annually for three years: so the full term is practically four years. A new vice-cancellarean term has just begun at Oxford, Prof. Benjamin Jowett, master of Balliol college, having completed his four-years' tenure. His successor is Dr. Bellamy, president of St. John's college, a man of conservative tendencies, and of whom nothing but good is spoken. Professor Jowett has been called the most learned man in England, and his vice-chancellorship, quite in keeping with his reputation, has been notable. He may be called a radical, so far as that term will apply in the field of scholarship, and he has been instrumental in breaking down many of the old traditions that have trammelled his university and limited its usefulness. Under his active direction, the Indian institute was opened, the new physiological laboratory built and endowed, — a tremendous blow to the conservative element, — a new theatre built for academic uses, an actor invited to lecture before the university, the examination schools used as ball-rooms, and a non-conformist college actually founded. Corresponding to these external evidences, Professor Jowett has infused into the university a spirit of catholicity and tolerance utterly new to it. It is safe to say that among his greatest works will always be reckoned his liberalizing of the ancient university. His services to the cause of education are of inestimable value, and we trust he may long be spared to enjoy the honors he has so richly deserved.

ARTICULATENESS IN ANY SCHEME of education is essential to its perfection. In state-controlled education this articulateness is obtained by law, but in countries like our own it is left to circumstances and the discretion of the authorities of the separate grades of educational institutions. All honorable endeavor should be made, therefore, to bring these authorities frequently together, that they may learn each other's wants and necessities, and work together for their common end. An attempt to do this is being made to-day in Philadelphia, where a convention of teachers interested in preparing boys for college is being held. Papers are to be read, — those announced in the

programme are by Professor James of the University of Pennsylvania, and Professor West of Princeton, — and followed by general discussion. The meeting should be a valuable one, and we trust it will be. It would be especially notable should it prove to be the first step in bringing our colleges and preparatory schools into frequent and close conference in some official manner.

A CIRCULAR FROM PROFESSOR LESLEY, state geologist of Pennsylvania, announces that Mr. C. A. Ashburner, who has in recent years acted as geologist in charge, has resigned this position for the purpose of associating himself with a company in Pittsburgh, that, among other projects, proposes to undertake a systematic search for and development of natural-gas fields for economic uses. Mr. Ashburner's services on the state survey, especially in the anthracite region, are well known and highly appreciated by American geologists, and it is fortunate that part of his time may still be given to the completion of work at present in hand. It is gratifying also to see that Mr. Ashburner's geological studies have led him to so practical and valuable a knowledge of the occurrence of natural gas, that his guidance in the search for this new fuel is now needed by commercial men who measure their good opinion in high salaries, with which the pay for the more purely scientific work of a geological survey, as measured by legislative opinion, cannot compete.

PLEURO-PNEUMONIA, which has lately given the authorities so much trouble and anxiety in Illinois, is steadily advancing into other states. It is now attacking herds of cattle in the counties of Harvard, Clinton, Newton, Jasper, and Benton, in the state of Indiana, and it is reported that infected animals have been shipped to other counties. The U. S. authorities have, in our judgment, been very remiss in their duties in respect to contagious pleuro-pneumonia. The increased prevalence of this disease was brought to their attention some years ago, and they were urged by sanitarians and veterinarians alike to take the steps necessary to its control and extinction; but the appeals were in vain. It will be found, we predict, before many months have passed, that the government must take the most radical steps if it expects to cope with this disease, which has already cost the country millions of dollars, and will doubtless cost it as many more before its progress is stayed.

MR. ALFRED RUSSELL WALLACE, D.C.L., who read a paper before the National academy of sciences at Boston recently, and who is to deliver Lowell institute lectures this year, should need no introduction to American students and scientists. Mr. Wallace shares with Charles Darwin the honor of having discovered the laws of the modification of species and of natural selection. Mr. Darwin, in the introduction to his 'Origin of species,' refers to Mr. Wallace's work in the same fields as his own. Mr. Wallace, however, is more conservative than the more ardent Darwinians in his limitation of the scope of the laws of natural selection. Mr. Wallace's principal writings, aside from his numerous special contributions to the proceedings of learned societies, are, 'Travels on the Amazon and Rio Negro' (1853), 'Palm trees of the Amazon' (1853), 'The Malay Archipelago' (1869), 'Contributions to the theory of natural selection' (1870), 'Miracles and modern Spiritualists' (1875), 'Geographical distribution of animals' (1876), 'Tropical nature' (1878), 'Island life' (1880), 'Land nationalization' (1882), and a work edited by him on Australasia, to which he was also a large contributor. In 1885 Mr. Wallace published an essay on 'Bad times,' ascribing them to an excessive war expenditure, the increase of speculation and of millionnaires, and to the depopulation of the rural districts. Mr. Wallace's political and social opinions are not so authoritative as those on subjects in the domain of natural science. The socialists, anti-vaccinationists, and Spiritualists all claim Mr. Wallace as one of themselves, though with how much reason we do not know.

THE GREAT ATTENTION that the phenomena of hypnotism have attracted in France, owing doubtless to the prevalence of that nervously volatile temperament necessary for a good hypnotic subject, has culminated in the establishment of a monthly review, already referred to in *Science* (Sept. 3, p. 207), devoted exclusively to this subject (*Revue de l'hypnotisme expérimental et thérapeutique*). The editor is Dr. Edgar Bérillon, who has gathered together a goodly array of collaborators. 'Hypnotism is the order of the day:' thus says the opening editorial. Societies having for their object the investigation of this side of psychic life are flourishing; many physicians (in France) are employing it as a therapeutic agent, especially in nervous diseases; the question of responsibility in this condition must be discussed

by medico-legal experts; the physiology and psychology of this attention-cramp, or whatever we call it, must be worked out. Hence a review. Judging from the contents of the first four numbers of the *Revue*, one must pronounce it a very convenient publication. It will enable one to follow the development of this interesting movement with least waste of time. It differs from the proceedings of our psychic research societies in that its aim is essentially practical, and the interest it represents largely medical. True, we are introduced to such novelties as hypnotizing through the telephone, and the action of medicaments at a distance; but these are brought forward to show the extent of the change in sensibility in hypnotics, not as evidences of 'supernormal' gifts. There is a large scientific field for this sort of study; and physicians, particularly specialists in nervous diseases, are the ones best qualified to take it up. On the whole, the movement represented by the staff of this review may be regarded as a very promising one.

THE REPORT of the British commissioners of customs for the last fiscal year contains some interesting statistics and observations. We learn, that, inclusive of warehouse charges and the revenue of the Isle of Man, the customs revenue for the year amounted to £19,916,995, a decrease of over £800,000 from the receipts of the preceding year. Some of this difference is attributable to the fact that the receipts for the last quarter of the preceding year were unusually increased by the general expectation that the duty on some articles, notably tea, was to be increased; and consequently unusually large imports were made in order to gain the advantage of an increase in the customs tax. The consumption of coffee, as measured by the customs returns, continues to decrease, the commissioners saying that not even the low duty of one and a half pence a pound is able to counteract the inconvenience which is inevitable in its preparation for consumption in comparison with tea. If the receipts from coffee, based on the returns of ten years ago, had kept pace with the growth of population, they should have yielded this year a revenue of £227,644; while as a matter of fact they yield only £207,977. The decrease in the receipts from rum and brandy together amounts to £195,610, which seems a proof of a real and large decrease in the consumption of them. Tobacco shows an increase of £12,351; but, as much of the quantity imported is still in storage, this sum does not fairly measure an increased consumption. As regards smuggling, the commissioners observe that it is in tobacco that nearly all the frauds on the revenue by importation are attempted, and they regret to have to report that their experience leads them to conclude that an organized system of smuggling is in operation at all the large ports trading regularly with countries where tobacco is to be bought at a slight increase on its cost of production, and that to effectually check this illegal practice great severity of the revenue laws and the utmost vigilance of the officers are necessary.

ACCORDING TO THE ANNUAL REPORT of the commissioner of internal revenue, the receipts of the U.S. treasury from that source for the last fiscal year were $116,902,869, an increase of about $4,500,000 over the receipts for 1885. The cost of collection was 3.6 per cent of the amount collected; last year it was 3.9 per cent. Violations of the internal revenue law seem almost wholly confined to the mountainous districts of Georgia, North Carolina, Tennessee, Kentucky, and Virginia, where considerable illicit distilling is carried on. Property to the value of $286,902 was seized during the year for violations of the law, 6,242 distilleries were registered, and 6,034 operated, during the year. In reference to the operation of the new oleomargarine tax law, the commissioner says that "it is impossible at this time to estimate the amount of internal revenue which will be derived from oleomargarine. If, however, the operation of the law should prove unsatisfactory in its present form, which is construed to levy a tax only upon the article manufactured and sold or removed for consumption or sale as supposititious butter, the law can be so amended as, while imposing a tax upon oleomargarine-oil, neutral, and such like substances, without which the supposititious butter cannot be extensively manufactured, to provide also for the use of such substances by subsequent compounders without the payment of a second tax, as rectifiers are allowed to compound distilled spirits on which the tax is paid without paying an additional gallon-tax, simply by delivering up the original tax-paid stamps, and receiving in exchange other stamps representing the same quantity; also for refunding the tax on so much as is used for lubricating purposes or otherwise in the arts and sciences. In my opinion, the advantage in securing the tax from the manufacturer who derives his material from the slaughtered

animals cannot be overestimated. These manufacturers are comparatively few in number. By requiring them to stamp and brand all their productions, and to keep such books as will indicate the destination of their products, such products can be followed to the dealers, and through the dealers to the customers. At the same time, by the use of a system of exchanging stamps similar to that now in operation as to distilled spirits, the article may be readily identified by the consumer without necessitating the imposition of a second tax."

The skill displayed by Mr. Edward Burgess in the application of scientific principles to the construction of yachts has again received a mark of appreciation from the Naturalists' club of Boston, to which he belongs, and which last year gave him a dinner to commemorate the victory of the Puritan. Last Friday, at a dinner given in his honor, at which some fifty members were present, the club presented him with a pair of silver salt-cellars modelled after 'nature's most graceful designs,'—one of them a miniature Nautilus inscribed 'Puritan;' the other an Argonaut-shell of similar size, marked 'Mayflower;' and both excellent copies of the originals; while the spoons have handles of twisted rope, and on the back of the bowls, delicately raised pictures of the famous yachts. No pains were spared in the workmanship.

WOMEN ON THE NEW YORK SCHOOL BOARD.

As was foreshadowed in a recent number of *Science* (viii. No. 197), the movement in favor of the appointment of women to the board of education in New York City, has been successful. On Wednesday of last week, Mayor Grace filed his appointments, and the list was found to be made up of three new men, two of the old commissioners who were re-appointed, and two women. In taking this step, the mayor has put himself in line with advanced thought on this subject, and has, we feel certain, contributed in no small degree to the increased efficiency of the public-school system. For years women have sat on the school boards of London, Edinburgh, and other foreign cities, and many of our own towns and school districts choose one or more women among their managers. When we consider the character of education in general, the peculiar conditions of public instruction, the fact that a large proportion — not infrequently a majority — of public-school students are girls, and that fully nine-tenths of the public-school teachers are women, the reasons for the presence of women on the boards of education are apparent. Then, too, it is highly probable that the presence of women commissioners will raise the deliberations of a board of education to a higher plane, and lift them out of the political entanglements in which they are too often caught.

All these considerations apply with peculiar force to New York City; and, moreover, these commissioners of education enjoy a position of great influence and honor. The board of education has general supervision of the whole school system. It appoints the principals of schools, but not the teachers. these are appointed by the trustees of the various wards, who, in turn, are chosen by the board of education for a term of four years. All the money and supplies for the schools are voted by the board, and all repairs and new buildings and the purchase of sites are directed by it.

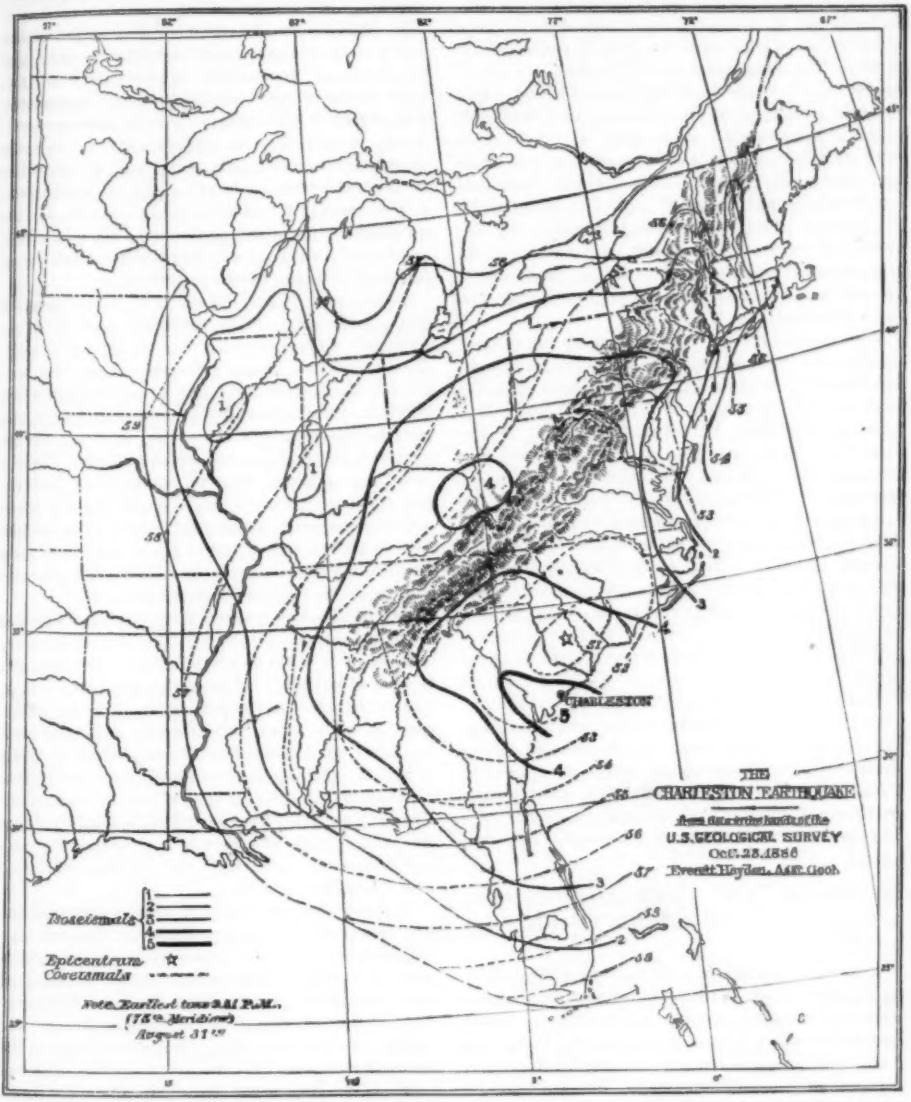
In making these particular appointments, Mayor Grace has avoided what would have been a great mistake. He has not appointed any 'cranks' or any professional agitators for 'woman's rights.' At such a time plenty of these persons come forward as candidates, but their appointment would have been turning the whole movement into ridicule. Both of the women chosen by the mayor are of the highest standing, morally, intellectually, and socially. They are neither agitators nor theorists, but women of pure Christian character, great ability, and, what is quite as essential to a commissioner of education, some common sense. They are both deeply interested in education, and close students of its theory and practice. Distinguished for years in connection with the prominent charities and philanthropic institutions of a great city, we have every reason to predict that the character and talents which they bring to their new and somewhat trying office will elevate and improve its public-school system.

THE CHARLESTON EARTHQUAKE.

We are indebted to the Philosophical society of Washington for permission to use the accompanying map in advance of its regular publication in their Proceedings. It was presented by Mr. Hayden to illustrate his paper on the Charleston earthquake, read before the society on Oct. 23, and represents graphically the data which had reached the U. S. geological survey concerning the distribution of the earth-wave from the great shock of Aug. 31, as to area, intensity (isoseismals), and time (coseismals). It was compiled mostly from information sent in by private correspondents, and it will be interesting to compare it with

results obtained later, when much additional data will be at hand from the signal service, lighthouse board, and other official sources.

Calls for information in the public press and by circular letters have been so generously responded to, however, that the lines may be regarded as fairly well established, although if our readers notice any inconsistency between the times and relative intensities, as plotted, with any facts which have come to their knowledge, the survey will no doubt be glad to hear of it. These lines, when drawn from reliable observations, form, perhaps, the most important of all records that can be made, and on such data the future progress of seismology must be largely based.



The outer isoseismal (where the shock was felt

by only a few persons) encloses a land area of 774,000 square miles, and adding only half as much more for the ocean and gulf makes the disturbed area very nearly as large as that given by Reclus for the great Lisbon earthquake of 1755. Indeed, the state department has reported one reliable observation showing that it reached Bermuda. The irregularities of the isoseismals are, of course, due to the varying geologic and topographic structure of the country, and will well repay a more careful study than we have space for here. The rapid loss of energy in the sands and alluvial deposits of the north-east coast and lower Mississippi valley is especially noticeable. The isolated areas of different intensities, too, are typical of cases which would be very numerous were it possible to plot intensities in great detail, instead of only indicating the general features of their distribution.

The coseismals were determined by many very reliable and consistent but non-instrumental observations, the most accurate being from points in that part of the disturbed area north of a line from Jacksonville, Fla., to St. Louis. For the most part, high velocities of wave-transmission are indicated. Where the lines are somewhat crowded, it must be owing, at least in part, to the earlier tremors having failed to reach so far; so that a later phase of the wave was successively felt and recorded. The general use of standard time has added greatly to the reliability of these observations; and, on the whole, we may perhaps be justified in feeling a certain sense of self-satisfaction, in view of Mallet's remark, that "the accurate measurement of time is one of the surest indications of advancing civilization."

At the present age of this young and interesting science, probably the most valuable results will be obtained from observations made at numerous points in a selected district, with some simple instruments which will accurately record the time, number, and duration of every shock that occurs.

TECHNICAL AND MANUAL TRAINING CLASSES OF THE SOCIETY OF DECORATIVE ART.

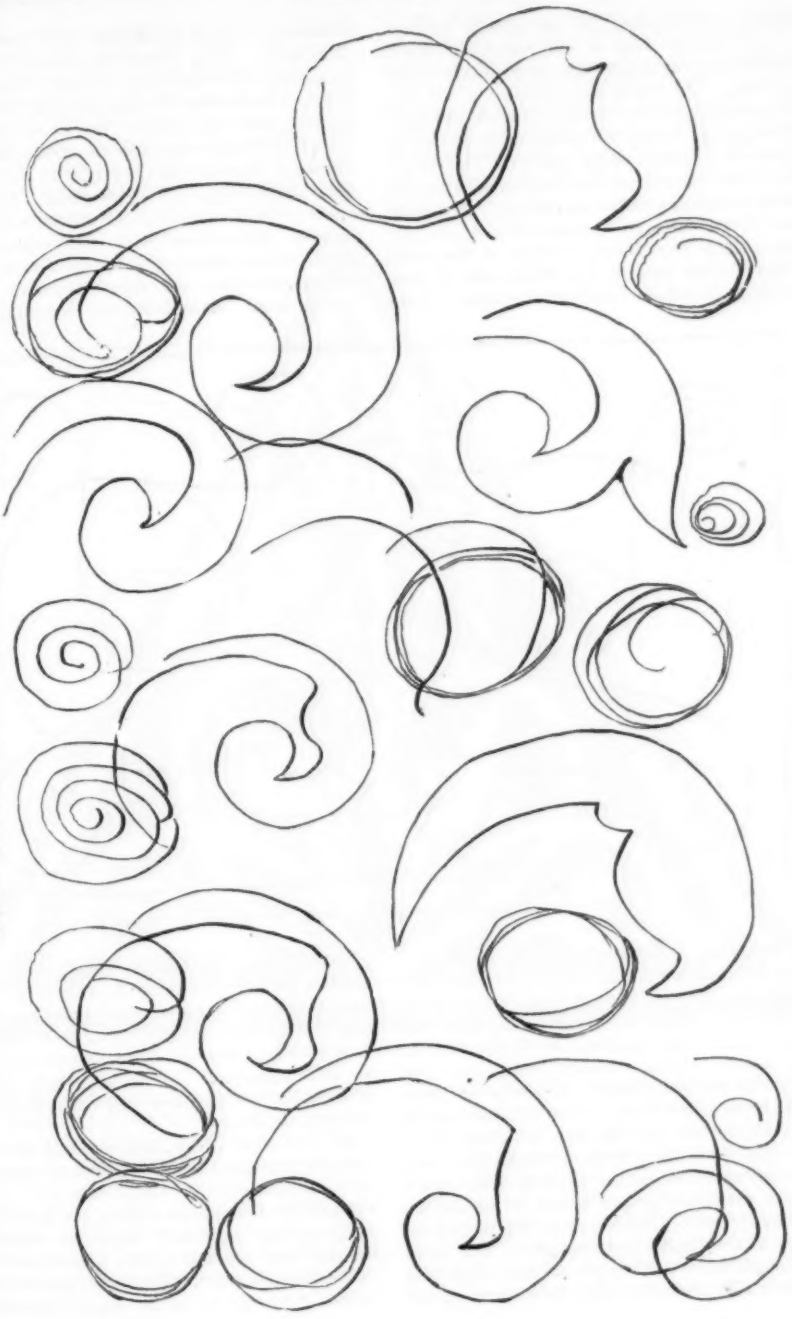
In the autumn of 1885 the Society of decorative art of New York, desiring to extend its educational advantages, opened an art-school, where men and women, boys and girls, might be trained in the principles of art, and in the rudimentary steps of various art-industries. The first season was one of much usefulness and encouragement, and the second opens with promise. The school is centrally located in West 23d Street, Nos. 37 and 39. An important feature of the school, in addition to classes in drawing, painting, modelling from life, from still-life, and from the antique, is a special department in manual training, as applied to practical designing, modelling in clay, wood-carving, and metal-working.

In considering the plan of instruction of this new school, the fact must be borne in mind that the work of the Society of decorative art has, from its inception, been distinctively educational. The object of the society was to develop art-industry in America; to extend among women the knowledge of art-needlework, and its adaptation to household decoration; to provide instruction; to lend books; to give helpful criticism for the guidance of those at a distance; and, in addition, to furnish a salesroom where artistic work might be brought to the notice of purchasers.

In the brief period of its life, — less than ten years, — the society has faithfully striven to accomplish these purposes. A standard of color-design, workmanship, and adaptation, has been created through its influence, — an influence which is felt in every home throughout the country, and may be recognized in the wares of the humblest shop where decorative materials are sold. Needle-work was almost a lost art, so entirely had the sewing-machine triumphed: it has already taken a place among art-industries. Hundreds of women have been trained by the society, and have gone forth to earn a living and provide homes for themselves and those dependent upon them.

The demand of the age is for workers — men or women — who can 'do.' The artisan who has command of head and hand alike is the one who is sure of success. Human machines can have no chance in competition with those who are intelligent in their work. Head-craft and hand-craft combined give to the worker a solid stone on which to stand. The society's department for technical and manual training provides just this education. Classes have been formed where boys and girls are taught to think and do; to use brain, eye, and hand together, that they may become intelligent and disciplined workers.

The school is fortunate in having secured the services of Mr. J. Liberty Tadd as director, who brings to his work an enthusiasm and confidence born of success. The keynote of his teaching is, that everybody has capacity in some direction. Training will develop the peculiar aptitude. The earlier in life this work of training begins, the better for the pupil. The child, restless and impatient, is eager to try its hand, and welcomes a suggestion to 'make something.' This desire is gratified and directed, interest is held, ambition stirred, and thought developed. The result is calm, quiet growth, an appreciation of labor, a

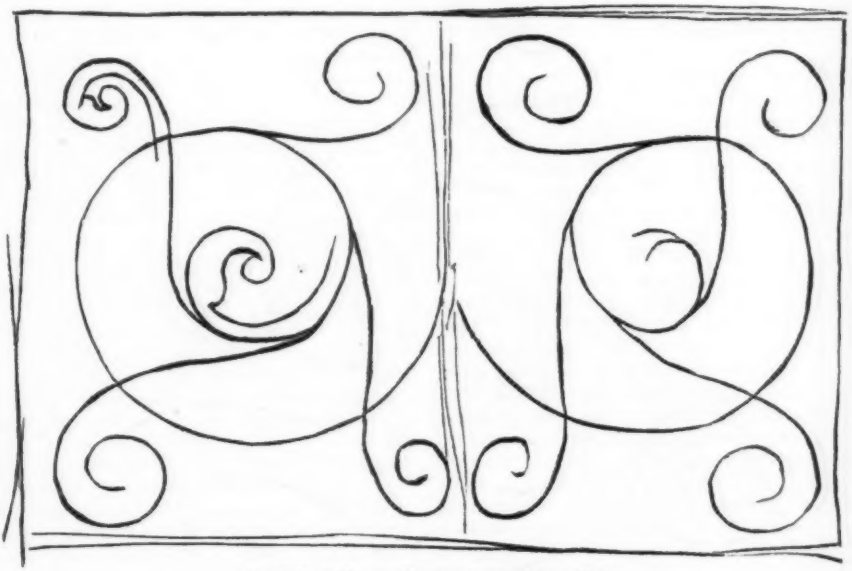


ELEMENTARY PRACTICE AT THE NEW YORK ART-SCHOOL (slightly reduced).

knowledge of material, and an ability to both plan and execute that is surprising. Children cannot be made interested and enthusiastic by abstract ideas. They must see, to know.

At the foundation of technical study lies practical designing. Some knowledge of its principles is necessary in almost every pursuit. The acquisition of this knowledge, and reasonable skill, may be easily obtained without special gift or artistic talent. Let us take, for example, one of the free classes. These meet three evenings of the week. The students are ranged on either side of long tables, each of which commands a view of the large blackboard. In front of each pupil is a sheet of clean brown paper, a piece of rubber, and a pencil.

The instructor draws upon the blackboard with a piece of chalk the elements of all drawing or design, — three lines, straight, diagonal, and curved. He explains that the first step in drawing is to learn to put these down with free sweep of the hand, — no piecing out or adding to a broken, given-out line. Many attempts are made, and many sheets of paper covered with crude efforts, to catch the proper knack or to acquire steadiness of hand. But paper is cheap, and the struggler is not limited by material. The hand has naturally more facility in some directions than in others: this tendency must be controlled, and evenness of action developed. It cannot be done all at once. Then comes the second step. The elementary lines are to be combined into certain forms, — motives of the Persian, Egyptian, Greek, Roman, Moorish, modern French, or any other school of design chosen by the instructor. These forms are drawn upon the board: the pupil repeats them on the side of his paper. He has now a leaf as his dictionary, and will in time learn the peculiar characteristics of each school of ornament. He is asked to take the forms given, to enlarge, combine, and repeat them in a pattern which shall be suitable for something, — sofa-cushion, frieze, mantel-tile, church-panel, or locomotive plate. The pupil is called upon for a mental creation. He draws a square or rectangle and locates the central point, from which and around which the intervolutions of his pattern are to be arranged. At this stage he is apt to find himself rather dazed and helpless. He is obliged to think definitely.



A BOY'S (AGE 11 YEARS) FIRST DESIGN (same size).

He is assisted a little, and his ideas brought into shape by the question, 'For what do you propose to make a design?' Usual answer, 'A panel.' 'That is too indefinite: a panel for a door, wainscot, ceiling, sideboard, desk, or chair-back?' Suppose the decision to be a sideboard. Then follow the questions, 'How many panels are there to be?' 'Are all to be the same shape and size?'

'Is the design to be carved in relief, or outlined on the wood?' etc. When the thing has been so variously and closely considered, the pupil has quite distinctly a mind-picture of his sideboard, and he sees his design, or the one he means to make, in its place, reproduced in material. He knows exactly what he wants to do, the leading thought being the adaptation of his design to the

The designs are drawn in narrow ribbons or spaces about half an inch wide. When the pattern is finished, to make it more vigorous, it is thrown into relief by blackening the background. This is done with India ink and a brush. This is a lesson in accuracy. To follow the curves neatly, preserving a strong, clean outline, is no easy matter. A free, steady, and true hand is needed.

THE BOY'S SECOND DESIGN (one-third size).

place and material in which it is to be given permanent shape. The first result is crude, and unworthy of his own thought, but day after day the improvement is marked. With deftness of hand comes strength and vigor of conception. The same motives will weave themselves into a hundred different combinations; and yet, through all the deviations and intricacies of a geometrical figure or Arabesque scroll-work, may be seen the original elements.

The best work is marked for inspection, and placed against the wall. In three months' time there is usually a display of much artistic value.

As yet, the work has been only on the flat surface. The pupil must go further. When a good design has been made, the important requisite is to give it form, to 'put it into the round' by repeating it in clay. Here the work is tested in the cheapest possible material, and here the pupil learns to use his hands in earnest. Artist and

artisan meet in the modelling-room, for in this reproduction the truth of art is found. In the dividing, handling, and manipulation of material their use is learned, and with this knowledge comes power. Fidelity, experience, and skill acquired in the use of clay give double value to the later work in wood, iron, brass, copper, stone, or marble.

When the student repeats his conception in the clay with his own hand, when, instead of a flat surface, his work takes form, he learns its minute details, and sees what lack of fitness there may be in the design. He is trained also to a system of

MODELLING FROM LIFE.

'values,'— the value of material and of labor. He learns that it is the skill of the artisan which gives value to material. The modelling-room makes flexible and develops every muscle of his hand and wrist.

The school attempts no graded course at present. The pupil, however, who undertakes wood-carving or metal-work without some knowledge of design, can never be an independent worker. The first need when he takes up his panel or his sheet of copper or brass, before a tool is handled, is ability to draw thereon a pattern.

Many specimens of wood-carving and metal-work done by students can be seen at the schools; as well as the actual processes themselves. The woman who takes fifty cents' worth of oak, or eighty cents' worth of mahogany, and can add to it as it passes through her hand such beauty of carving that its value is increased a hundred-fold, has a power that is worth something. The range of wood-work is unlimited. Panels, mirror-frames, a substantial wood-box, a massive hall settee with antique scroll-work, are made, all with ornamental carving. In the metals, among the many articles made, are brass finger-plates for doors, silver napkin-rings beautifully chased, copper plaques, Arabesque corners and hinges for boxes, tables, and so on.

It is a painful truth that not all the men and women who set before themselves an artist's career can or do succeed. But talent and industry may raise a man or woman from the rank and file into distinguished standing, both in the minor or industrial arts and in the higher fields of sculpture and painting. The two departments stand in a helpful relation to each other, and should be so considered.

This is the stand-point from which the art-school of the Society of decorative art is working. The classes of the industrial and technical department are free three evenings in the week. One of these evenings is to be given particularly to the instruction of those who wish to become teachers. The day classes, held morning and afternoon, have a moderate charge. The studios are open, and free to students for practice, every day.

A small but carefully chosen library has been opened this season, where, in a bright room, the

SOME OF THE RESULTS.

pupils may have access to books and current art-literature, foreign and American, with opportunity for quiet thought and study.

The motive of the whole system is true education, and intelligent work on the simplest, most practical principles. No attempt is made in the technical and manual training classes to specialize. A boy or girl is simply prepared for life, ready for any trade to which they may be called, in command of self, with a knowledge of what can be done, and a power to do it accurately, intelligently, and skilfully. But leaving out all question of artist or artisan, there is a discipline, a culture, and a training of the powers of observation, that are of inestimable value in after-life.

From time to time during the winter, lectures are given at the school upon subjects connected

with the studies. Visitors who wish to see the work of the school will find the studios open each day from nine until twelve in the morning, and from one until four in the afternoon. The free classes are taught from half-past seven to half-past nine, Monday, Tuesday, and Wednesday evenings of each week. EMMA MOFFETT TYNG.

RIO DE JANEIRO LETTER.

THE scientific movement of Brazil can afford but little matter of interest to the outside world. Within the last few years a few isolated workers have succeeded in making their names known beyond the limits of the country, but for the present they are too few to have established any noteworthy centres of scientific thought, either in the way of societies or periodicals. Outside of the medical profession, which maintains a very creditable society and one or two special journals, the spirit of association has taken the direction mainly of organizing geographical societies, of which Rio de Janeiro boasts of three,— the old and highly reputable though decidedly fossilized Historical, geographical, and ethnological institute, the more recent Rio de Janeiro section of the Lisbon geographical society, and the Rio de Janeiro geographical society. Each publishes its review, mainly valuable on account of the insertion and discussion of old and little-known documents, recent contributions of importance rarely appearing. This abundance of geographical societies is not due to a superabundance of active workers, but to a sudden outburst of enthusiasm and fraternal good feeling, awakened by a visit from the Portuguese explorer of Africa, Major Serpa Pinto. On this occasion Brazilians and Portuguese united in founding a section of the Lisbon society to commemorate his visit. National rivalries soon appeared, however, and led to the withdrawal of a portion of the Brazilian element to found the Rio de Janeiro society, which, of the three, appears at present to possess the most vitality and promise of usefulness.

The other scientific publications are the *Archivos do museu nacional*, of which six volumes have been issued, containing articles on archeology, anthropology, zoölogy, and geology, contributed mainly by the officers of the museum; the *Annals da Escola de minas de Auro Preto*, of which the four volumes published are mainly devoted to metallurgy and mineralogy; and the recently established monthly *Revista do observatorio*, which is taking a very useful direction in the collection of meteorological observations from various points of the empire. Private enterprise in the publication of scientific journals has taken the direction of technical reviews for engineers and architects, of which three are published. In the absence of other organs, articles of general science are sometimes inserted in these, particularly in the oldest and best established of them, the *Revista de engenharia*. The last number of the *Archivos do museu*, issued near the end of last year, contained profusely illustrated articles on the extraordinary ornamented pottery of the mounds of Marajo. The next volume, to be issued shortly, will be devoted to a memoir by Dr. C. A. White of Washington, on the Brazilian cretaceous fossils, and will undoubtedly be the most important contribution ever made to South American invertebrate paleontology.

Since the beginning of the present year, three official commissions have been organized, from which results of some value may be expected, and of which notice has already been given in *Science*. The first in point of time is for a geographical and geological survey of the province of San Paulo, on the plan of the U. S. surveys of the territories, under the charge of Prof. O. A. Derby of the national museum. The first work undertaken was the exploration of the second largest river of the province, the Paranapanema, tributary of the Parana. The party, consisting of Dr. Theodoro Sampaio, geographer, with Dr. J. W. Aguiar as assistant, and Dr. Paula Oliveira geologist, embarked on the upper river May 22, and has only just returned, having traversed about 900 kilometres of difficult river in a sparsely populated, almost desert region, and about 500 kilometres by land, all in a region that had never before been scientifically examined. The river was found to be full of dangerous falls and rapids in its middle section, of the extension of about 120 kilometres, but comparatively free from obstruction in an upper section of 200 kilometres, and a lower section of 309 kilometres. The latter section promises to become an important link in the system of internal communications with the distant province of Matto Grosso. For over half its course, the river flows through a region of bedded traps, presumably of triassic age. The chief of the commission has been engaged in the examination of a remarkable development of nepheline sienites, occurring in several points of the province, and in such intimate association with typical volcanic rocks, tuffs, phonolites, trachites, nepheline, leucite, and olivine basalts, as to establish the volcanic character of the whole group. The passage of nepheline sienite to phonolite is clearly demonstrated, and leucite rocks are reported for the first time in South America.

A second commission, appointed by the minister of agriculture, is for a study of the disease of

the coffee-plant, that during the past few years has destroyed a large number of plantations over a considerable area in the northern part of the province of Rio de Janeiro. This is intrusted to Dr. Emil Göldi, an able and energetic young Swiss naturalist, who has recently been appointed sub-director of the zoölogical section of the national museum. Dr. Göldi has been in the field for the last two months, studying the disease *in situ*, but as yet has not made public any of his results. A valuable biological contribution may be confidently expected from this commission.

A third commission, headed by Dr. J. B. Lacerda, well known through his researches on snake-poison and on beriberi, is about to proceed to the northern provinces of Pará and Maranham to study the disease beriberi, which is extending rapidly over the north of the empire, and is beginning to appear to an alarming extent in the south as well. The last steamer to New York takes the president of the chamber of deputies, who is making a sea-voyage in the hope of throwing off the disease; and a prominent physician of Rio, who was appointed on the beriberi commission, has been obliged to resign on account of having become a sufferer from it. As has already been noticed in *Science*, Dr. Lacerda attributes the disease to a microbe, a conclusion which has been confirmed by Dr. Ogata Masanori of Tokio, in Japan. Up to the present time, elements for the study of beriberi have been rather difficult to obtain in Rio, and the present study in the principal centres of the disease will undoubtedly add greatly to our knowledge on the subject. Dr. Lacerda has also been investigating a very similar disease of horses, very prevalent in the provinces of Pará and Matto Grosso, known as *peste da Cadeiras*, or hip-evil, which at one time he was inclined to identify with the beriberi; but he has recently discovered some well-marked differences in the micro-organisms characteristic of the two.

Considerable interest has been manifested among medical men in the proposed American commission to study Dr. Frere's yellow-fever investigations, and methods of inoculation. The work of Dr. Frere seems to have awakened a more lively interest abroad than here. The official support that he received as president of the board of health has been withdrawn since his retirement from that post, on account of his commendable, though perhaps not always judicious, efforts to suppress the powerful industry of manufactured wines, while the general attitude of the medical profession is that of extreme reserve. While he has a number of very fervent followers, a number of pro minent physicians have vigorously combated his conclusions. As few, if any, of his critics, are practised microscopists, he has been able to meet their scientific arguments quite successfully, but has been less fortunate in the defence of his statistics regarding the immunity of inoculated persons. Like all Brazilian statistics, these are too loosely drawn to inspire confidence. A large proportion of the inoculated has been among the shifting population, whose subsequent history can only be followed with difficulty; and Frere is accused of not admitting that the disease is yellow-fever, in the case of the death of an inoculated person, no matter what the opinion of the attending physician may be.

The National museum has recently received several interesting additions. The veteran paleontologist of Buenos Ayres, Dr. Hermann Burmeister, made it a present of a very perfect skeleton of Scelidotherium, and added greatly to the value of his gift by coming in person to superintend the mounting of it. Although in his eightieth year, Dr. Burmeister is still vigorous, and looks able to continue his work for several years yet. While in Rio, he received many attentions from the emperor and imperial family, and found himself obliged rather reluctantly to accept from the emperor the decoration of dignitary of the order of the rose, which is next to the highest rank of the order, and one seldom conferred. The museum has also received a fragment, weighing nearly two kilograms, of the famous Bendigo or Bahia meteorite, the second largest mass of native iron known; and hopes are entertained of obtaining the entire mass, which is estimated to weigh about nine tons, and lies about sixty miles away from a recently constructed line of railroad. A wealthy gentleman of Bahia is inquiring into the feasibility of transporting it with the intention of placing it in the museum if it be found practicable. The latest addition is a perfect skeleton of a whale, apparently Balaena australis, measuring about fifteen metres in length, which was stranded a few weeks ago in a little bay to the south of Rio.

Dr. Barbosa Rodriguez, director of the museum of Manaos, province of Amazonas, has just announced the rediscovery of Lepidosiren, of which no specimens have been found since the time of Natterer and Castelnau, and whose existence in South America has recently been put in doubt. It may now be confidently expected that specimens of this rare and interesting animal can be obtained in large numbers. Y. A.

Rio de Janeiro, Oct. 15.

M. C. Guyot, professor in the School of forestry at Nancy, is preparing an important work on 'Les forêts lorraines jusqu'en 1789.'

NOTES AND NEWS.

THE knowledge and appreciation of our educational institutions by European scholars are largely on the increase. M. Buisson, who came to this country as a French commissioner to the New Orleans exposition, made a special study of our advanced educational institutions, and is now contributing a series of articles on the subject to the *Revue internationale de l'enseignement*. The first of these has already appeared, and, after some introductory paragraphs, describes Columbia and Harvard colleges. M. Buisson has grasped clearly the nature and functions of the board of regents in New York state, and makes plain the relation sustained by that body to the various colleges and academies of the state. He was particularly impressed with Columbia's great library, and frankly says that it seems to him 'the ideal of what a university library should be,' not because of the number of its volumes, but because of its scope and organization. M. Buisson describes with great minuteness of detail the working of the library, and recommends it to the consideration of those having in charge the re-organization of the library of the University of Paris.

— Below is given the standard time-table for high schools for girls in Germany, drawn up by the commission appointed by the minister of instruction. It will shortly be adopted throughout Germany. The figures in the various columns represent hours per week.

Subjects.	Grade IX.	Grade VIII.	Grade VII.	Grade VI.	Grade V.	Grade IV.	Grade III.	Grade II.	Grade I.
Religious instruction	2	3	3	2	2	2	2	2	2
German	9	9	9	5	5	5	4	4	4
French	—	—	—	5	5	5	4	4	4
English	—	—	—	—	—	—	4	4	4
Arithmetic	3	4	4	4	4	4	2	2	2
History	—	—	—	—	—	2	2)	4	4
Geography	—	—	2	2	2	2	2)		
Physics and physiography	—	—	—	—	2	2	2	2	2
Singing	—	—	—	2	2	2	2	2	2
Writing	—	—	—	2	2	—	—	—	—
Drawing	—	—	2	2	2	2	2	2	2
Gymnastics	2	2	2	2	2	2	2	2	2
Needlework	2	2	2	2	2	2	2	2	2

— Dr. Schliemann, after a fruitless journey to Crete, has returned to Athens. Before leaving Constantinople, he was informed by the Turkish authorities that he must make such terms with the Cretans as he found possible, but that he must in any case pay down £1,000 as a guaranty that he would take nothing away from such excavations as he might make. The conditions under which he had formerly excavated in the Troad, namely, that he should have all the duplicate objects exhumed, were considered far from lenient, inasmuch as real duplicates very rarely occur. Taking advantage of the situation, the owners of the ground that he desired in Crete demanded £4,000 for it, and insisted upon his including in the purchase more land than he really wanted. So Dr. Schliemann came away without having dug his spade into the ground, though he saw, peeping out from the hill he desired to excavate, a huge building; but whether it was a megarm or a temple he could not tell.

— The professor of archeology at the University of Berlin, Dr. Furtwängler, has arrived at Olympia to arrange the objects which have been claimed by Greece from the excavations now concluded, in a large museum built on the spot by a patriotic Greek for their reception. He is also examining the various objects anew for the large work that is being prepared on Olympia, the German professor having been himself formerly one of the directors of the excavations.

— The first meeting of "the international congress having for its object technical, commercial, and industrial training," met at Bordeaux a few weeks since. We see no notice of any delegate from the United States being present. The conference brought clearly into view two points: 1°, the encouragement there is in the recognition of the fact that England, France, Germany, Spain, Italy, and Belgium, as well as other countries and dependencies, have common ends in view in commercial and industrial education; and, 2°, that while this first international congress was merely tentative, yet it has paved the way for future congresses to come to a surer agreement regarding principles, and to develop substantial unanimity in details. In addition to the valuable papers that were read, debates and discussions were held daily during the session of the congress, and it is believed that they contributed to give the nations of Europe a clearer and sounder knowledge of the aims and methods of technical education.

— The lord-almoner's professorship of Arabic at Cambridge university, made vacant by the resignation of Dr. Robertson Smith, the newly elected university librarian, who has held the post since Prof. Edward H. Palmer was murdered by the Arabs, has been conferred on Hon. Ion Grant Neville Keith-Falconer, M.A., of Trinity college. The new professor is the second son of the late Earl of Kintore, and, though but thirty years of age, he is very learned in the oriental languages and literature.

— It is remarked in England that the American historians are very popular there. Almost simultaneously, new editions of Prescott and of Park-

man have been issued by London publishers. "Prescott has a well-established reputation, and the brilliancy of Mr. Parkman's narratives will assuredly make him a classical historian in England as well as in America."

— James M. Cattell, Ph.D., son of ex-President Cattell of Lafayette college, has recently been elected lecturer on psycho-physics at the University of Pennsylvania. Dr. Cattell has been pursuing his researches for some time past in Professor Wundt's laboratory at Leipzig, and has formulated his results in articles which have been published in *Philosophische studien* and in *Mind*.

— The new volume of Trübner's 'English and foreign philosophical library' is 'Life and works of Giordano Bruno.' It is now ready.

— Students of psychology and of philosophy generally, will be glad to know that Dr. Ferrier's work on 'The functions of the brain' has been issued in a new edition. This new edition is essentially a new book, since it has been almost entirely rewritten, and now embraces the results of the author's latest investigations, as well as a critical survey of the more important physiological and pathological researches on the functions of the brain that have been published during the last decade. The chapters on the structures of the nerve-centres and the functions of the spinal cord have been enlarged to such an extent that the book is now virtually a complete treatise on the central nervous system.

— Volume viii. of Leslie Stephen's 'Dictionary of national biography,' including names from Burton to Cantwell, has been published. The Bruces, Butlers, Campbells, Burns, Burke, Byron, Mrs. Browning, Buckle, Caedmon, Cairns, and Cairnes are among the most prominent subjects treated. Volume ix. may be expected in January.

— Investigations made by the editor of the *Academy* in several hundred schools in every state in the union give the following result as to the methods of Latin pronunciation in use. Of the institutions, 6 per cent use the continental system, 46¼ per cent the Roman, and 47½ per cent the English. Some of these schools, however, are very large, others quite small; so that a comparison of the number of students trained in each method seems preferable. Such comparison shows 2 per cent using the continental, 46¼ the English, and 51½ the Roman.

— A recent presidential decree in France regulates the instruction in gymnastics in the *lycées* and colleges for girls. The instruction must be given by female teachers, who must have received a certificate of aptitude from the proper authorities. Such teachers are to receive from 1,200 to 2,000 francs per year each, and may be required to teach sixteen hours a week. They must teach at least twelve hours a week.

— The English association for the improvement of geometrical teaching, says *Nature* of Sept. 30, has revised its 'Syllabus of elementary geometrical conics,' and is about to publish the same, with three figures lettered in accordance with the enunciations of the Syllabus. The work will be interleaved to allow of teachers and students supplying their own proofs, and will, it is hoped, appear in November. Messrs. Swan Sonnenschein are the publishers.

— The Bombay government, according to *Nature* of Sept. 30, has issued a long resolution on the subject of technical education, which is one of special importance to India. The resolution lays down the outlines of the scheme which it favors under three heads,— agriculture, art, and mechanical industries. It proposes that the College of science at Poonah shall be a central institution for the teaching of higher agriculture, and that local classes and schools shall be established throughout the province under the supervision of district officers and of the educational department. The Jamsetjee Jeejeebhoy school of art in Bombay is to be the centre of government efforts for the purpose of art-teaching, and a report is called for as to the propriety of obtaining additional teaching. The question whether a technological institute for mechanical industries should be established is discussed at some length, and the government expresses the opinion that the time for doing so has not yet come. Meanwhile it is suggested that the committee of the Ripon memorial fund should form itself into an association for promoting technical education in Bombay City, the government promising to give it the utmost possible aid. The main dependence of other parts of the province must be upon the high schools for elementary science, and upon such institutions as may be started by means of local efforts. The resolution concludes by saying that the scheme is not academic, but that it is meant to enhance the well-being of the people at large by giving increased employment to labor and capital, and by cementing harmonious relations between them.

— Dr. R. G. Eccles read a paper before the pathological society of Brooklyn recently, in which he gave the results of a long series of experiments, extending over nine months, on the value of the different pepsines in the market, and in which he showed that some of the pepsine furnished by reputable manufacturers was almost valueless, and yet sold for a price considerably

above that of other dealers whose product was very active in the conversion of albuminoids into peptone. His experiments also included the retarding effect on digestion of many of the remedies which physicians prescribe to be taken at meal-time.

— Colonel Majendie, the English inspector of explosives, is now in this country, studying the methods here adopted for the regulation of the storage and sale of inflammable materials. During his stay he will visit the oil-regions of Pennsylvania and examine the oil-wells.

— As a supplement to the last number of the *Rivista di filosofia scientifica*, is issued an interesting prospectus of a new *Rivista pedagogica Italiana*, to be issued Nov. 1, under the direction of Prof. Francesco Veniali, general inspector for the minister of public instruction. Each issue will contain several articles on theoretical and applied pedagogics, a *résumé* of the progress of educational thought and activity in Italy and throughout the world, correspondence, and the full text of all official documents on education. Professor Veniali has secured as co-operators the principal professor of pedagogics in Italy, the chief government inspectors of schools, and the directors and professors of the larger normal schools. There is every reason to suppose that the new *Rivista* will be a most valuable acquisition to educational literature.

— The new rules promulgated by the educational department in France present several changes. Women are admitted as teachers at the age of seventeen, but men not until eighteen. A very important clause provides that in public schools of every description all instruction is to be given exclusively by laymen. This takes from the clergy their last hold on elementary education, for hitherto they have had the right to nominate in the schools a certain number of teachers who were not subject to the regulations under which the government teachers worked. These teachers were under the direct control, not of the minister of education, but of the superior of the religious society by whom they were appointed. In the new rules, too, the regulations respecting the qualifications of teachers, both public and private, have been made more stringent.

— The committee of the school museum at Berlin proposes to celebrate in 1890 the centenary of the birth of Diesterweg by founding a Diesterweg pedagogical museum.

— The first volume of the *Deutsche encyclopädie, ein neues universal-lexicon für alle gebiete des wissens*, has been published by Grunow of Leipzig. It comprises ten hundred and seventy pages devoted to topics whose names begin with the letter A.

— The *English historical review* for October contains an erudite and valuable article on the 'Origines of the University of Paris,' by Rev. H. Rashdall.

— The London *Journal of education* draws the following lessons from Mr. Matthew Arnold's recent report on education on the continent of Europe: 1. *All* teachers must be trained, no more acting certificates must be granted, and the college course must be extended to at least four years. 2. The demoralizing system of annual grants, dependent mainly on individual papers in the three R's, must be abolished. If the fixed capitation grant were doubled, and the remainder assigned by general merit, we should have a workable but not a perfect system. 3. The school-years must be extended. At present, in England, school-life ends, on an average, at eleven years of age: on the continent it ends at fourteen. 4. Schools must be graded.

— The first report of the Royal commission (English) to inquire into the working of the elementary education act is a large folio of 543 pages, and contains 13,684 questions and answers, in addition to voluminous appendices.

— The law by which it is forbidden in Germany to give instruction in any subject without a proper certificate or other qualification, has lately been extended to cover the case of private teachers.

— Mr. Albert V. Dicey and Mr. Harold B. Dixon have been elected fellows of Balliol college, Oxford. Mr. Dicey is Vinerian professor of English law and a well-known writer, and Mr. Dixon is lecturer on physics.

— The recent election for rector of Edinburgh university resulted in the choice of Lord Iddesleigh over Sir Lyon Playfair.

— Rev. Dr. Montagu Butler, lately head master of Harrow school, has been appointed master of Trinity college, Cambridge, in succession to the late Dr. Thompson. This position is one of the most eminent in England, and is in the immediate gift of the crown. The income is £2,670 per year.

— The *Deutsche geographische blätter* of Bremen publishes several original papers on the natives of North America. Mr. Henry T. Allen reports on the Atnatánas, or Indians of the Copper River, who, to the number of 366, occupy a territory of 25,000 square miles; Mr. Charles N. Bell of Winnipeg deals with the Ojibeways in north-western Canada; and Dr. H. Rink summarizes the information recently collected by Danish travellers respecting the Eskimo of eastern Greenland.

— Volume xxi. of the 'Encylopaedia Britannica,' which has just been issued, contains several distinctively philosophical articles. They are 'Rousseau,' by George Saintsbury; 'Scepticism,' by Andrew Seth; 'Schelling,' by Professor Adamson; 'Schleiermacher,' by Rev. J. F. Smith; 'Scholasticism,' by Andrew Seth; and 'Schopenhauer,' by Prof. William Wallace.

— Every once in a while some new hint is dropped concerning the forthcoming biography of Darwin by his son. The last is that Professor Huxley will contribute a chapter, and that the book will bear strong testimony to the influence exercised by Sir Charles Lyell over Darwin.

— Professor Tyndall's stay in Switzerland has greatly benefited his health, and he now intends to deliver the Christmas lectures at the Royal institution in London himself.

— Dr. Köhler has been succeeded as director of the German school at Athens by Dr. Peters, late professor of archeology at the University of Prague.

— The programme of the Aristotelian society of London for the winter is unusually interesting. Mr. Shadworth Hodgson opened the year's work with an address on the re-organization of philosophy. Other papers will treat of Malebranche, Leibnitz, Lotze, T. H. Green, Hegel's 'Philosophie des rechts,' and the Augustinian philosophy. Dr. Cattell of Leipzig will give an account of some recent psycho-physical researches. The ancient distinction of logic, physic, and ethic, the relation of language to thought, the distinction of fact and right, and the theory of motion, will be treated by other members of the society; and the session will be closed by Dr. Bain, 'On the ultimate questions of philosophy.'

— A new encyclopaedia of education is being prepared in England under the editorship of Mr. A. Sonnenschein and Rev. E. D. Price.

— Capt. R. L. Pythian, U.S.N., was ordered to duty on Nov. 14, as superintendent of the naval observatory at Washington. Commander A. D. Brown, who has been acting as superintendent, will continue on duty at the observatory as assistant superintendent.

— Herbert H. Smith, who has been collecting natural history specimens in South America for several years, left Rio de Janeiro for this country over a month ago upon a sailing-vessel. He brings with him enormous collections.

— The number of those who are now invalids as the result of the war is said to be 265,854, the total number of soldiers having been about one million and a quarter.

LETTERS TO THE EDITOR.

The swindler at work again.

I enclose for the benefit of others a letter from a swindler in the west, addressed to me, over the very well forged signature of Charles D. Walcott, U. S. N. M. (national museum at Washington), dated simply 'Cook co. Normal, Nov. 7, 1886.' Chicago is in Cook county, Ill. It requested the immediate despatch of a set of geological reports to Prof. George Wells Litz, of the Cook county (Ill.) normal school, and his colleague, Professor Parker.

Cook co. Normal, Nov. 7, 1886.

Prof. John P. Lesley.

Dear Sir,— Will you kindly send to Prof. George Wells Litz, of the Cook county (Ill.) normal school, a complete set of the reports of the second geological survey of Pennsylvania. I am indebted to him, and to his colleague Professor Parker, for a most delightful Sunday, and wish to place him and his friend in the way of getting literature at present inaccessible to them.

An early compliance with this request will be considered a great favor, and one to be soon repaid by your friend, Charles D. Walcott, U.S.N.M.

Mr. Walcott informs me by letter, after seeing the above letter, that he had tried to trace the rascal, but thus far without success. The fellow has obtained, under various false pretences, quantities of specimens, books, and sometimes money, from eastern geologists. J. P. Lesley.

Effect of electric light on plant-growth.

"The light from an electric-lamp tower in Davenport, Io., falls full upon a flower-garden about one hundred feet away; and during the past summer the owner has observed that lilies which have usually bloomed only in the day have opened in the night, and that morning-glories have unclosed their blossoms as soon as the electric light fell on them."

The above item, which originally appeared in the *Democrat* of this city, and has gone the rounds of the press, has a substantial basis of fact. The 'Jenney' system of electric lighting was introduced into this city early this past spring, and across the street from the residence of Mr. Henry W. Kerker is situated one of its towers. This tower is 125 feet high, and contains five arc lights, each of 2,000 candle-power. During the past summer, Mr. Kerker's attention was attracted to the singular effect these lights produced upon some day-lilies blooming in his garden. These flowers closed as night came on, but, as soon as the electric lamps were started up, they re-opened, and while the lights were in operation continued in full bloom. As the street is about 80 feet wide, the lights were distant some 200 feet from the flowers. Other similar observations here are reported, but, as they are less accurately verified, I pass them for the present without special mention.

Chas. E. Putnam.

Davenport, Io., Nov. 19.

Milk-sickness.

This disease seems to have received but little attention from the medical fraternity, probably on account of the supposition that its ravages are circumscribed to the area within the confines of its origination; yet it is presumed that such is not the

fact, and that hundreds die annually, in places far distant from the localities of its origination, by the use of meat and butter shipped from such places, as the dairy products of localities infected with this scourge have to seek a market from home; and as a natural sequence they find their way into the large cities, thus placing the fatal poison into the mouths of many.

Physicians unacquainted with it are apt, after diagnosing it, to give it fever treatment; and the resultant sequence is, that the patient dies. So the physician soon finds that he has a disease that in its special pathology, from the closest observation, he has given a febrile nosology; yet the febrile therapeutics only hasten dissolution. From its febrile semeiology, it is likely to mislead those not familiar with it in its diagnosis.

The effect of milk-sickness upon 'dry cattle,' males and sucklings, is death; but the milk-giving cow excretes the poison in the lacteal fluid, and receives but little, if any, perceptible injury from it. The buttermilk is said to be as harmless as that from well cattle, while the sweet milk and butter hold the poison; yet, from the statement of many, it does not seem to be held in solution after the milk is drawn from the cow, but seems to have a magnetic attraction for itself, thus segregating all its minute particles from the milk or butter, conglomerating and conglutinating into one imperceptible particle until swallowed by some one, when the virus at once becomes active. It is stated, upon seemingly good authority, that of a milking, if drank while sweet, although a dozen persons may partake of it, yet only one will contract the disease; and the same statement is made as regards the use of the butter made at one churning.

This disease occurs among cattle that browse on the north side of the Blue Ridge and foothills, and in dark rich coves where there is but very little sunshine. It is positively stated, that, if the cattle in the localities where the disease prevails are not allowed to graze until after the dew evaporates, the disease will not appear, provided they are driven from the place before the dew begins to accumulate in the evening; but, when a cow eats any of the herbage with the dew on it, milk-sickness is the sequence. This is the unanimous statement of native residents in localities where it originates.

The following experiments have been made with it in Macon county, N.C.: One man placed a couple of bundles of corn-fodder out in the evening, and took them the next morning before sunrise, with the dew on them, and gave them to a yearling. It died in about three days with the disease. Another person placed a piece of good, fresh beef on a rock near a brook after sunset, and the next morning early he gave it to a healthy dog, which ate it, and died in four days of the disease. This evidence would tend to show that it was not induced in cattle from poisonous plants, but from a poison held in solution in the dew, and that it evaporates with the dew.

One Dr. Cauler, last year, in the Blue Ridge *Enterprise*, published at Webster, N.C., in writing of the etiology of the disease, stated that it was caused by arsenical poisoning. He said that there were cupreous deposits in the localities where it occurred, and that the "solar heat freed the arsenic from the copper, which the dew held in solution on the herbage;" yet it occurs in localities where no copper has been found. And then, a gentleman who has manufactured arsenic says that it would be unnatural for copper to give off arsenic so easily and so freely.

Another opinion is, that it is caused by the cattle's eating a poisonous fungus, as it has been found in the stomach of a cow that died with the disease. Webster, in defining milk-sickness, concludes by saying, 'Its cause is unknown.'

There are localities in Macon county, N.C., that offer excellent opportunities for studying and investigating fully that disease; and in the same county, at Smith's Bridge post-office, lives Dr. Brabson, who, it is claimed, is the only physician in the county that fully understands the treatment of the disease. This is a matter worthy of investigation, and is really of more interest to the public than they are aware, as reasons given in the beginning of this letter show.

J. W. WALKER.

Pine Mountain, Ga., Nov. 6.

[The disease to which our correspondent alludes in the foregoing letter was known in North Carolina during the past century, but was first brought to the attention of the medical profession about the year 1812. It subsequently appeared in Tennessee, Kentucky, Ohio, Indiana, Illinois, and other portions of the country. A very interesting account of this disease, and references to numerous writers, will be found in Wood's 'Practice of medicine.' As to the causation of the disease, very many theories have been held, although it seems to be generally conceded that the disease disappears as soon as the region where it exists becomes cleared up and cultivated. Some authorities have attributed to it, both in cattle and in man, a malarial origin; others have thought it to be caused by the poison vine, Rhus radicans. On this subject Dr. Wood many years ago said, "It appears to me that there is but one mode of approaching an explanation of these various phenomena. Providence may have planted in the rotten soil of our new lands certain germs, etc. Of the nature of these germs we are quite ignorant. They may be microscopic animalcules or mushrooms." Dr. Phillips observed cases on the upper water of Scioto, Ohio, and found in the blood "a great number of living, moving, spiral bacteria, similar, in their general appearance, to those spiral bacteria described by Professor Lebert as abounding in the blood of relapsing-fever patients. I also found in the urine of that patient those same spiral bacteria, and, coexisting with them, the sphero-bacteria, in segments of two to six or eight." Dr. Schmitt, who observed cases in the same region, found no bacteria in their blood. Professor Law, in the National board of health bulletin, vol. ii., No. 4, p. 456, says that "in its source, in unimproved marshy localities, it closely resembles the malignant anthrax, also in its communicability to all animals; but it differs essentially in that it fails to show anthrax lesions, in place of which it expends its energy on the nerve-centres, producing great hebetude and loss of muscular power. The germ is probably derived from drinking-water, or the surfaces of vegetables, as certain wells are found to infect with certainty, and the disease has been repeatedly produced by feeding upon particular plants (Rhus toxicodendron, etc.). That these plants, in themselves, are not the pathogenic elements, is shown by their innocuous properties when grown in places out of the region of milk-sickness infection. The great danger of this affection consists in the conveyance of the germ with unimpaired potency

through the flesh and milk, and through butter and cheese. The disorder proves fatal in man as in animals." As our correspondent says, this subject is one of great interest as a disease affecting both man and animals, and we should be glad to receive any information which will indicate its present home and prevalence. — Ed.]

The teaching of natural history.

I have been much interested in reading the rather unjust review of French's 'Butterflies' in a recent issue of *Science*, 'A teacher's' letter in a succeeding number, and Mr. S. H. Scudder's reply in the last. Unlike Mr. Scudder, I have been a teacher, although I have never had but one pupil, — myself; and, as I have him yet, I want to ask Mr. Scudder what I shall do with him. What education I possess was, with one exception, directed by the faculties of certain institutions, where nothing was known but Latin, Greek, and mathematics. The exception was in a high school where Gray's 'How plants grow' was used as a reading-book. The class never had a plant, a flower, or a leaf. The readers simply stood up and read the first one hundred pages of that book. The pupils asked no questions, they could not for evident reasons; neither did the teacher; and the latter volunteered no remarks; yet that botanical instructor was, it seems to me, adopting the plan advocated by Mr. Scudder, for he was not using Gray's book in 'finding out the mere names of objects:' he was allowing the book to discuss "the nature, meaning, and causes of the relative affinities of organized beings," so far as that little book could do. I did not learn the name of a single plant. I am more than sure that I learned none of the relative affinities of which Mr. Scudder speaks. How could I? Without the specimen, what meaning is conveyed to the beginner by, "A flower, with all its parts complete, consists of calyx, corolla, stamens, and pistils; one from the morning-glory will serve as an example"? The morning-glory, indeed! Why, this will never do. Morning-glory is the *name* of a plant, and Mr. Scudder says, 'The name may be called a necessary evil; and unless, with it, is more emphatically acquired a knowledge of the structural and biological relations of the object which it bears to other objects, it is worse than useless knowledge." In my case the name was not even a necessary evil, for it did not exist. I was supposed to be acquiring knowledge of structural relations in an elementary way, and the book was supposed to be teaching the class the affinities and relations of things botanical; but, so far as I am concerned, I am free to admit that the result was an abominable failure. How could I have obtained the flower called for, since I did not know the plant producing that flower?

When Mr. Scudder goes to a flower-show and sees a strange plant, does he engage the florist in a discussion about biological relations or structural affinities? No, I think Mr. Scudder says, 'What *is* that?' When Mr. Scudder finds a fossil insect, he doubtless studies its biological relations, since he is an advanced and accomplished naturalist; but, if he were an ignorant beginner, he would run to his teacher with the question, 'What *is* that?' And if he had himself for a pupil, who had not learned the structural affinities of 'the find,' he would ransack the books for the name; and, having found it, he would then have not only the key that opens the door to further knowledge of the work of other investigators, but he would have a peg as well, on which to hang his information and the result of his own investigations. If he would not do this, what would he do? In all kindness, with the heartiest feelings of esteem for Mr. Scudder, and with a burning desire to increase my own knowledge, let me beg Mr. Scudder to tell me what I shall do with my single ignorant pupil. How can I teach myself the biological relations and structural affinities of the butterflies, since I am not supposed to know the name of even the commonest butterfly? Without the name, what foundation have I on which to erect my future learning? I got the structural affinities without the names in my earliest botanical instruction. The result I do not approve. But if Mr. Scudder will tell me how to teach myself according to his plan, he will also be telling 'A teacher' how to teach his pupils, although I am *not* the author of the letter in the last *Science*. If I am not to begin by finding out the name, where shall I begin? If I dissect the butterfly, study its histology, and write a monograph on its ontogeny, and know not its name, what shall I call the book, and what will its readers say? Shall it be 'The structure and life history of *a* butterfly?' Of what butterfly? To my uninstructed eyes there seems to be more than one butterfly. If there are more than one, do they all have the same structure and life-history? Were I allowed to pursue what seems to be a natural and proper course, I would take French's excellent book, and having found the name of the specimen by French's excellent key, and having learned what French has to say in his text, I would, as I do, await the issue of Mr. Scudder's expected work on the butterflies with pleasant thoughts of anticipations about to be agreeably realized. But since this would be the wrong method, will Mr. Scudder kindly tell me what would be the right one?

A. Reader.

The classics versus science.

An editorial paragraph in *Science* for Nov. 19 suggests some curious reflections. If, as you say, Mr. Lowell's oration at Harvard "is itself a justification of a classical and literary education, and a living argument for a culture loftier and deeper than that which strictly utilitarian theories would provide," does it not logically follow that science deserves no place in the curriculum, and that your own journal has little excuse for being?

Science has been added to the course of studies largely because of the demands of the utilitarians; and only in recent days, and faintly, has its disciplinary value been urged.

Certainly, when one sees what is oftentimes taught as science, and is obliged to read the wretched English in which some scientific books are written, — which books, by the way, are highly lauded in scientific journals, — and, moreover, when one witnesses the temper of scientific men in treating those who differ with them concerning the latest ephemeral classification or other equally important point, one is inclined to side with the classicists in the belief that the study of science has little value either for purposes of discipline or culture; that it scarcely forms 'open-minded' men in the poet's sense; and that perhaps it would be better for all concerned that they should be 'digging Sanscrit roots.' F. W. Staebner.

Westfield, Mass., Nov. 21.

SCIENCE.—SUPPLEMENT.

FRIDAY, NOVEMBER 26, 1886.

PRIMARY EDUCATION IN ENGLAND.

Two of the functions which almost every modern state has been obliged to assume, whether in other respects its policy is *laissez faire* or state interference, are the support of its helpless poor and the education of its ignorant youth. Both of these matters were attended to in the Europe of the middle ages by the church, which, on account of its large endowments and its literary stores, was perhaps better fitted to relieve misery and spread the light of education than the state as then organized. England formed no exception to this rule. The early English monasteries could find almost the only reasons for their being, in the fact that the poor and helpless found, under their hospitable roofs, shelter and support, and that the children of the neighboring districts obtained the instruction they so sadly needed in the schools connected with them. These schools were established at about the same time that Christianity was adopted by the English people. Such a one was the school established in 680 by Theodore, archbishop of Canterbury. Later, schools were likewise provided in almost all the cathedral towns. These schools were employed by the clergy to keep their hold on the people; and with the reformation there naturally came a change in the educational system, which reflected that which had taken place in the relations between church and state. The laity were to have a share in the management of the schools, which were, however, to be supported in somewhat the same way as before.

The intention of the leaders of the reformation was to appropriate for school maintenance a large share of the property of the monasteries; but the king's friends were able to secure most of this property for themselves. Such schools as lived through this stormy period at all, or such as were founded soon after, had to subsist on private charity. A great many schools were founded as the immediate result of the reformation, but they were mostly grammar or higher schools, whose influence was necessarily limited; and it was not until considerably later that any attention was paid to primary education, — the only kind of education that can interest the masses of the people. Attempts had indeed been made to make some provision for the education of the children of the poor. Statutes had been passed in the sixteenth century under which schools for poor children were to be maintained by the clergy in each parish. But the great inequality in the distribution of the income of the state church — an inequality which all the expedients that have been devised have not done away with — gave the great majority of parishes barely enough for ecclesiastical needs: little, therefore, could be spared for the establishment of an efficient system of primary education. Parochial schools did exist in the richer parishes, it is true, but they were of a very poor character, and were supported by means of school-fees, or by the revenue of foundations; but in the larger number of the rural districts no schools at all were to be found.

But what the church had neglected to do was taken up by private associations, beginning with the latter part of the last century. In 1781 Robert Raikes founded the first Sunday schools; in 1803 was founded the British and foreign school society, managed by the dissenters; in 1811, the National society, the organ of the state church; in 1837 the Ragged-school society had its origin; and in 1850 there was formed by the large factory-owners the Lancashire public-school association. The two great names in this period are those of Andrew Bell and Joseph Lancaster, — the one a churchman, the other a non-conformist, and each the founder of the school society recognized as the agency of the religious body to which he belonged. To these two men, it has been said, England must "allow the credit of conceiving some sort of scheme for popular education, and of submitting proposals by which it might be carried out;" and it was through the societies founded by them or their followers that state aid, when it was finally given, was distributed. This began in 1832, with an appropriation of twenty thousand pounds. For several years before that, attempts had been made to secure state aid, but they were frustrated by the jealousies of the church and non-conformists. The "church was alarmed at any thing which seemed to trench upon what she naturally thought to be her appointed task. The dissenters dreaded what might add to the impregnability of the church's strongholds."

With this appropriation in 1832 begins, then, the assumption by the English state, of the duty, which is now universally recognized, of educating its ignorant youth. The period between 1832 and

the present time we may divide into three sub-periods.

First, the period of the pure subsidy system. Each year the appropriation was increased, until in 1860 it was thirty times as great as in 1832. It was originally intended that this appropriation should be distributed by the treasury department; but in 1839 this duty was transferred to the education committee of the privy council, which then began to take the form of an executive department for educational affairs. The principles which were to guide the committee in the distribution are found in a treasury minute of 1833, and were, 1°, that the sum granted was always to be expended in the building of schoolhouses; 2°, no grant was to be made unless one-half of the cost of building was met by voluntary contributions, and unless the application for the money was recommended by the national or the British and foreign school society; and finally, 3°, populous places were to have the preference in the allotment of the grants. When the subsidies were increased in amount, these rules were somewhat relaxed; so that, for example, teachers who had passed the committee's examination might be paid from the grant.

It will be noticed from this that all connection between the schools and the state was voluntary on the part of the schools; but, so long as this connection lasted, the school was subject to state inspection. Under this system great material progress was made, as is seen from the reports of the committee of the council of education. The most important for this purpose is that contained in Parliamentary papers, 1864, vol. xlv. This report marks the end of this first sub-period, and shows that during it the inspection districts had increased in number to sixty, that 4,628 schoolhouses had been erected, and that from 1839 to 1864 £7,400,000 had been expended. But the quality of the education given in the schools was very poor. The teachers originally had no pedagogic training whatever. The monitorial system of teaching, as developed by Bell and Lancaster, had been adopted. By it the pupils taught each other under the nominal supervision of a teacher. Instruction was principally in religious matters, since the schools were mainly sectarian; and though secular instruction was thus given a disproportionately small share in the system of education, yet no sound religious instruction was given to counterbalance this disproportion. This may be seen from the following written answers, from children of average intelligence in an inspected school, to the questions, 'What is thy duty towards God?' and 'What is thy duty towards thy neighbor?' "My duty toads God is to bleed in Him, to fering and to loaf withold your arts, withold my mine, withold my sold, and with my sernth, to whirchp and give thanks, to put my old trash in Him, to call upon Him, to onner His old name and His world and to save Him truly all the days of my life's end." "My dooty toads my nabers, to love him as thyself and to do to all men as I wed thou shall and to me; to love, onner, and suke my farther and mother; to onner and to bay the Queen and all that are pet in a forty under her; to smit myself to all my gooness, teaches, sportial pastures and marsters," etc.

To remedy a system which could lead to so lamentable and at the same time so grotesque results, a trained staff of teachers had to be obtained. This was done by establishing training-colleges, to which school managers were to send students, and from which they were to receive back teachers, to be paid in great part by the state, and provided with certificates granted by the state, which thus guaranteed their efficiency.

In 1851 as many as twenty-five of these training-colleges were established. But the establishment and maintenance of these institutions necessitated a great increase in the parliamentary grants, which in 1852 reached the sum of £160,000. As the greater part of these grants went to the schools founded by the national society, the agency of the state church, which did most of the educational work (during the years from 1839 to 1864, out of £7,400,000 the church schools had received £4,450,000), the dissenters became very much alarmed. They claimed that the grants were an artifice for increasing church revenues. In the course of this dispute there arose, for the first time in the history of English education, a party which advocated the adoption of a state "secular system, administered, irrespective of religious belief, by local and elective bodies;" while the dispute itself led to the appointment of what is known as the 'Commission of inquiry of 1858.' Though the plans proposed by this commission were not adopted in the form in which they were submitted, still they were the point of departure for the new movement, which we may say begins with the Revised code of 1863.

The second sub-period, then, is the period of the Revised code. The education department had been getting ready to revise its system. To do this, an abstract of all of its regulations was made in 1858. In 1860, Mr. Lowe, the vice-president of the committee of council, draughted the regulations in the form of a code, arranged in chapters according to subjects. It now fell to him to embody in his code the suggestions contained in the report of the commission of 1858. This he did by revising the code, which was thereafter

known as the 'Revised code,' and by which the relations between the state and the educational system were to be regulated. The Revised code went into operation on July 1, 1863. The principal change introduced was the provision calling for an increase in the requirements which must be fulfilled in order to obtain a portion of the grant. For instance: it provided, that, to obtain a share of the grant, a school must be held in approved premises, and must be under the charge of a qualified teacher, who, though licensed by the state, was to be paid by the school managers; the attendance of the children must reach a certain specified minimum number; while their attainments must be proved by individual examinations in reading, writing, and arithmetic. A point in which this revised system differed from the former one was, that while, under the latter, the grant was either totally given or totally refused, it might now be given in part, the amount granted depending on how well the required conditions were fulfilled.

The immediate effect of the adoption of this Revised code was the falling-off of the grants; since the education which the children had received under the old system was so poor, that very many were unable to pass the standard examinations. Mr. Lowe's cynical remark — that "if the new system [i.e., the system of the Revised code] is costly, it shall at least be efficient; if it is inefficient, it shall be cheap" — was thus shown to be a correct forecast of the effect of the code. But while in this way the faults of the old educational system were demonstrated, complaints were made that school managers, in their efforts to comply with the provisions of the Revised code, in order to obtain large grants, pressed the children too hard, and limited the instruction given to the subjects required for the standard examinations. The purely educational result of the code was thus the reduction of the general intelligence of the pupils. To obviate this difficulty, an amendment to the code was adopted in 1867, which gave a special grant if certain new conditions were complied with, such as the teaching of subjects not required for the standard examinations. This and other amendments improved the code, so that, in its final form, it may be said to have been a success as far as it went. The grants increased after it was fairly in operation, amounting in 1869 to about £800,000. Accommodation was offered in the inspected schools for nearly 2,000,000 children, while about 1,300,000 were actually in attendance. But, as will have been noticed, the code did not at all change the voluntary character of the system. The actual motive power of the schools came from the 200,000 persons whose voluntary subscriptions started, and with the aid of the state supported, the schools. There was no legislative provision that would prevent the possible decrease or absolute cessation of such voluntary subscriptions; and in such case the whole educational system, built up by so many years of earnest effort, would vanish into empty air. Again: the problem of what and how religious instruction should be given, came to the front with special force, since almost all the state-aided schools were denominational or sectarian schools: therefore when the reform bill of 1867 was passed, by which the suffrage was greatly extended, it was felt that a corresponding strengthening and widening of the educational system was necessary. This led to the passage of the elementary education act of 1870, which, with its amendments, now regulates the primary education in England.

This brings us to the third sub-period, that of the present primary educational system. The main characteristic of the elementary education act of 1870, is, that though it was intended to supplement the previously existing system, yet it imposes on the various localities the legal duty of providing a sufficient amount of school accommodation in public elementary schools; i.e., in schools where the ordinary school-fee does not exceed ninepence a week, in which no attendance at religious instruction or at religious worship is required, in which a sufficient instruction is given in reading, writing, and arithmetic, and which is open to the inspection of the education department. Where a sufficient number of such schools does not exist in the district (which is made the unit for school administration, and is practically equivalent to the poor-law parish), the education department itself may, on the refusal of the district to act, form a school board to carry out the provisions of the act. If the district proceeds to the formation of such a board voluntarily, it may do so. These boards are composed of from five to fifteen members, chosen in the incorporated towns from those registered on the borough list, and in the parishes by the rate-payers; i.e., those who pay local taxes. Each elector has as many votes as there are members to be elected, and may distribute his votes as he wishes, massing them all on one candidate, or scattering them among as many candidates as he has votes. The intention of this clause in the act is to provide for the representation of ecclesiastical minorities; for, as we have seen, one of the great problems to be solved in the adoption of the educational system was the reconciliation of the different religious sects. The boards elected in this way have charge of the management of the schools which they establish,

and have the power to make by-laws by which children from five to thirteen years of age may be compelled to attend school. This is the only provision in the act of 1870 relating to compulsory attendance, which was thus made absolutely dependent upon the will of the school boards. In the localities where no such board existed (i.e., in localities supplied with a sufficient amount of proper school accommodation), compulsion was impossible, while in those possessed of a school board it was in the power of the board not to adopt the necessary by-laws.

The expenses of the schools established by the local boards were to be defrayed from a school fund provided for by the act. This was to consist of school-fees, of parliamentary grants, and of a compulsory local rate. As much of the expenditure was of a permanent character, the school board was given the power to borrow money on the security of the school fund.

The whole educational system was kept under the control of the education department, which inspected all the state-aided schools, revised the accounts of the school boards, and could enforce the execution of the law by means of its power to step in and do any work that had been omitted by a defaulting district, at the expense of such district.

Such were the leading features of the act of 1870, whose main purpose, it has been said, "was to establish a fixed and statutory local authority where the casual efforts of local benevolence and zeal had failed;" and this purpose was in the main accomplished. Both the statutory and voluntary agencies increased greatly in number. School accommodation nearly doubled between 1869 and 1876. In 1876 the schools cost £3,500,000, of which £750,000 came from subscription, £370,000 from local rates, and more than £1,500,000 from the parliamentary grants.

One point for criticism and amendment yet remained, — the attendance was very small: indeed, it hardly exceeded 2,000,000. This subsequent statutes have attempted to remedy. The most important of them are the elementary education acts of 1876 and 1880. These made it the duty of the parent to have his child educated in the elementary branches, and also placed new restrictions on the employment of children when it might interfere with their education. They added a new local authority, called the 'School attendance committee,' which, as well as the school boards, must pass by-laws requiring compulsory attendance; and they gave the local school authorities more extensive powers for the enforcement of attendance in case of neglect, and for the encouragement of regularity among those children who professed to attend. The result of these acts was, that in 1885, when compulsion was in operation throughout the entire country, the average attendance was over 3,400,000; there was accommodation for more than 5,000,000; while the parliamentary grant had reached £2,867,000, the subscriptions £756,000, the local rates something more than £1,140,000, and the school pence £1,791,000. The schools thus cost, in all, for their annual maintenance, £6,550,000 in 1885.

From this short sketch of the history and present position of English primary education, we see that its characteristics are, 1°, universal compulsory attendance; 2°, obligatory maintenance of proper unsectarian schools by the various localities; 3°, supervision of the whole system by the central organization, — the education department, — which has power to step in and remedy the neglect of recalcitrant localities.

As a result of the fact that these elementary education acts are simply to supplement a system of schools existing at the time of their adoption, the present elementary schools of England fall into three classes. The first class is composed of the denominational schools, as they are called, supported by the school societies, and existing independently, as before, in all towns and places in which foundations, private subscriptions, and the large resources of the school societies, are sufficient to provide the school accommodation required by law. About one-third of all the school-children in England attend these schools even now. The second class is composed of schools denominational in name, and connected with church societies, but supported only in part by church funds, the remainder of the cost of their maintenance being made up from state grants or local rates. These are spoken of as public schools, are under the inspection of the school authorities, and are maintained as schools for all denominations. The majority of the schools belong to this class. The English church maintains most of them, receiving for so doing half of all the state aid granted. In the third class are the newly formed board schools, under the direct administration of the district boards, and existing in the poorer districts. These are continually increasing in number. They receive a sum from the state grant which is considerably larger than the amount received by all the denominational schools outside of those directly connected with the church.

FRANK J. GOODNOW.

THE freshmen at Cambridge university, England, this term, number 938, of whom 197 go to Trinity college. The freshmen at Oxford number 616.

THE ASSIMILATION OF COURSES OF STUDY FOR BOYS AND GIRLS.[1]

MRS. FAWCETT has lately said that it had been reserved for the nineteenth century to discover that a woman was a human being. This is indeed a somewhat epigrammatic statement; but it expresses a fact which, in education as in other matters, has been too frequently overlooked. Boys and girls — for with them at present we have to deal — are both human beings, and as such have far more points of likeness than of difference, and possess many faculties in common. This sounds a truism; but nevertheless, in spite of this obvious fact, education in earlier days was conducted on the principle that boys had one set of powers, needing certain studies, and girls another set, needing quite other subjects in their school-work; and that, for instance, boys should learn Latin, while for their sisters there was, so to speak, the softer feminine of the Roman speech, Italian. This theory is somewhat as if, for physical development, boys were to be fed always on beef and mutton, and girls on ices and sugar candy. The common sense of mankind, however, overlooking the manifest physical difference as irrelevant in the matter of nutrition, has always considered that boys and girls need the same kind of bodily food, at all events; and in the present day, when the laws of health are more widely known, we all agree that these apply equally to both sexes, who alike need, for perfect growth, fresh air, cold water, and exercise. When, however, mental training and mental food are considered, a different opinion obtains, or, rather, has obtained. This is the more remarkable, for there is in this case no proved or manifest difference psychologically, and the scientific study of the mind has not given any reason to suppose that any such difference does exist. The error has arisen, perhaps, from an imperfect ideal of what education ought to be. If it is merely a sort of technical training for the practical work of adult life, then, obviously, as men and women will in general occupy different spheres of work, boys and girls should study different subjects, — boys, let us say, arithmetic, physics, geography, etc.; and girls, needlework, music, and household management. This narrow ideal of education has, we hope, few adherents among teachers. They recognize a noble end, — that of training all faculties of our nature to their highest degree, and of producing, not an engineer or an accountant, a nurse or a dressmaker, but a fully developed human being, with all powers so cultivated as to be able to act and to enjoy, to labor and endure, — in a word, to live, — as completely and perfectly as the allotted place given to the individual, man or woman, may permit. It would therefore seem to follow that any study which has been marked out for boys because of its value as training, would be equally valuable for girls, as the intellectual powers are common to both sexes, and there is no *prima facie* evidence that the mind is male or female, but rather a presumption in the other direction. Now, classics and mathematics have in modern times justified their place in the curriculum of our boys' schools by their value as training, either of the reasoning powers or the literary taste. Whether they, exclusively, induce such effects, is a question to which we shall return later. Granting that they do, they should be taught equally to boys and girls, and the ideal curriculum should be in most points the same.

Having discussed the theoretical considerations, we may now proceed to examine practical results, and see whether these bear out our theory. The first fact to be mentioned, and perhaps the most convincing, is, that an examiner of considerable experience has informed us that he does not notice any differences in papers submitted to him (which he, of course, knows only by their numbers) from which he can form any opinion as to the sex of the writer. The reports of the Cambridge local examiners, in which the work of boys and girls is separately mentioned, afford no definite evidence of any difference. We remember one report on English composition which did show such, but not at all what the average reader would expect. The girls' work showed much more accuracy and careful thought, and far less absolute nonsense; but the boys showed greater imagination. Again, boys and girls are prepared for the Matriculation examination of the University of London, and pass it equally well: we imagine, indeed, that the percentage of passes for girls is considerably higher. Whatever the positive meaning of this may be, it negatively confirms the theory. The results of the degree examinations are too well known to need remark. Other data come to us from Cambridge. It would have been said fifteen years ago, from those imagined inclinations of the feminine mind to the softer studies, that the mathematical tripos would have been the last to attract many of the students of Girton or Newnham. The facts are exactly opposed to this forecast. Up to the year 1882, a greater proportion of Girton students entered for the mathematical tripos than for any other; and, further, pupil after pupil from one of our girls' public schools went up to Cambridge to study mathematics; so much so, that it was found necessary to warn those who

[1] From *Educational times*, November, 1886.

intended to make teaching their profession, that the supply of women mathematical teachers would exceed the demand, and advise them to take up other branches. The reason was, doubtless, that in mathematics it was easier to make up for the lack of early training than in classics; and from the same cause many, especially those who went up in later life, took moral science. Now, when the movement is older, and girls are trained for Girton, as boys for Trinity or Balliol, classics has been, since 1882, the favorite subject, as far as numbers are concerned.

A teacher who has had considerable experience with girls, and some practice in teaching boys and men, may be forgiven, perhaps, for adding a few generalizations drawn from personal knowledge. It is perfectly possible to teach girls Latin and mathematics, and even to create enthusiasm for the study. On the other hand, some girls are careless over Latin, and hate mathematics: but this is due to the 'old Adam' of laziness, and could be matched, we imagine, in boys' schools. It is almost impossible to teach geometry or algebra to some girls; but there are men and boys with whom the same difficulty occurs. The writer has met with such, and so probably have most teachers; while history gives us no less eminent an example than Lord Macaulay. We have never come across a girl who absolutely could not do Latin, though we know many who do it badly. We also have read classics with a very good mathematical man whose Little-Go was a burden scarcely to be lifted, and have heard college fellows express a similar opinion about their own undergraduate days. Again: we have found that to teach an older man mathematics is very much easier than to teach a woman who begins at the corresponding age; but this we believe comes from the fact that the life-work of the man had been concerned in commerce, with numbers and measurement, while the woman probably never did any harder thinking than the ordering of a dinner or the planning of a gown. However, in all such cases there is a danger of forming inductions from few data, and individual experience can have only a value when strengthened by other evidence. Whether women, indeed, will ever do as well as men in the higher subjects of a university course, is a matter on which we have our doubts; but it is, at any rate, irrelevant to the case in point. Here we feel assured that our experience will coincide with that of most teachers and examiners, to the effect that the teaching, and the results of teaching, classics and mathematics, are — other things, as to time, teaching power, etc., being equal — very much the same for boys and for girls, whatever they may be for men and women. Having laid down, then, the general principle of identity of subjects, it remains to be seen what the subjects should be. And here, when a reform such as that of the scheme of the First-class college of preceptors' examination is proposed, such a question is of the gravest importance, on general grounds, for boys as well as for girls.

The key of the whole position is the discussion as to the exclusive advantages of classics as training. And here we should earnestly deprecate the assimilation of the scheme for girls to the *present* scheme for boys, because we firmly believe that the girls' curriculum in our public and higher-class private schools is nearer the ideal than that for their brothers. To argue the question would be merely to re-write Herbert Spencer's book on education. But the reform of boys' education, and the removal of that incubus of classical study which, as a heritage from earlier days, weighs so heavily on us now, is so important a question, that, like the 'Delenda est Carthago,' it needs naming again and again. When so many studies, far more useful both to men and to women in practical life, all but cry aloud for a fuller share of our limited school-time, we must be very certain of the superiority of classics as training, to keep it in the place of learning which would help our boys to appreciate more fully their own beautiful language and the works of nature around them, and — no unimportant thing nowadays — to maintain in their manhood that supremacy in arts, manufactures, and commerce, which our country now sees endangered on every side. And, indeed, as Herbert Spencer shows, the training of reason and observation *is* furnished by those very subjects which are most useful, for nature is economical of power. We therefore hail gladly the proposed alteration in the regulations of the First-class examination; for, while maintaining the identity of subjects and standard for boys and girls, it nevertheless allows for that more modern education to which the tendency of the age is rapidly bringing us. Not long ago at Cambridge a determined effort was made to oust Greek as a compulsory subject from the Previous examination, or Little-Go; and in the late revision of the regulations for the Matriculation examination at London university there was an equally earnest attempt to make permissive a choice of languages, and thus not necessitate Latin. For both these, the ancient superstition was too strong; but the time of success is, we may hope, not far distant. When Oxford, much to the disgust of some of her older professors, has spent thousands on schools for natural science; when Cambridge has allowed

modern languages for the additionals, and has actually founded a modern and medieval languages tripos, — the younger universities and colleges will surely follow. To make Latin compulsory, therefore, is, from this point of view, distinctly inimical to educational progress, and is therefore unworthy of an institution which, like the College of preceptors, has in past years done so much to further the modern reforms in middle-class education.

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A SURVIVAL OF THE UNFITTEST.

IN his inaugural address before the sanitary congress recently held at York, Sir T. Spencer Wells, the president of the congress, touched upon a subject of great interest to educators. He said, speaking as a sanitarian, that so far as concerns the mental and physical training of children, and giving women the option of other occupations than those of domestic life, he saw no great cause for alarm. It is an age in which education — at any rate, for the middle classes — must be pushed far beyond the limits which our fathers thought wide enough for us. Mere rule-of-thumb work is almost out of date; and there are so many industries in which scientific knowledge and exactness are requisite, that the want of early education cuts off a young man's chances of advancement. A workman must now be something more than a mere machine. He must have head as well as hands, brain as well as muscle; and, as uneducated brains are not worth more in the labor-market than untrained muscle, we must be content to make some sacrifice in their culture. As for the outcry about the dangers of women taking up men's work, it is breath wasted. A great many failures will outweigh the few successes, and bring the balance right.

"For my own part," continued the speaker, "I think women capable of a great deal more than they have been accustomed to do in times past. If overwork sometimes leads to disease, it is morally more wholesome to work into it than to lounge into it. And if some medical practitioners have observed cases where mental overstrain has led to disease of mind or body, I cannot deny that I also have at long intervals seen some such cases. But for every such example I feel quite sure that I have seen at least twenty where evils equally to be deplored are caused in young women by want of mental occupation, by deficient exercise, too luxurious living, and too much amusement or excitement.

"Again: we have heard much of late about overpressure from work in schools. This is one of the novelties of our time. No doubt it exists, and I think it may in part be traced to some of our sanitary success. We have reduced the mortality of early infancy. Many children who would formerly have died off-hand, are now saved, and find their way into the schools. They are survivals of the least fitted. They live, but they are not strong. They have to submit to the same routine, and be forced up, if possible, to the same standard as the rest. But the effort is too much for them. Their frames are not hardy enough to resist the mental strain. They show all sorts of nervous symptoms, disappoint the teachers, and are the types brought forward as victims of the system.

"The vice of the system is that it is indiscriminate. There is no revision of the recruits, and the tasks are not apportioned to the feeble powers of sanitary survivors. This is an evil which will remedy itself in time by the growing-up of a larger proportion of strong children; and the present difficulty may be got over by a little patience and moderation, — a little more regard to sanitary logic. The children must have training before education, and must be put upon something even less than a half-time system."

THE POSITION OF SCIENCE IN COLONIAL EDUCATION.

AT the recent colonial and Indian exhibition, held in London, considerable attention was given to the condition of education in the colonies. At a conference held on this subject, William Lant Carpenter, B.A., B.Sc., whose scientific work is as well known in this country as it is in England, read a most interesting and valuable paper on the position of science in colonial education. Mr. Carpenter's paper is of such value that we reprint the major part of it from the London *Journal of education*. Mr. Carpenter said: —

The colonies to which your secretary desired me to confine my attention were, Canada generally; South Africa (the Cape of Good Hope and Natal); West and South Australia, Victoria, New South Wales, and Queensland; New Zealand and Tasmania, the last of which is unfortunately not represented at this exhibition.

If the term 'education' be used to include, not merely scholastic and collegiate training, but also any organizations and methods for drawing out the minds and faculties of the people, then a review of the position of science in colonial education should include all provisions for teaching it in any degree or form. Science in primary, secondary, and high schools of whatever kind, in technological schools with a view to its applica-

tion to the industrial arts, and in universities or colleges, should come under review, as well as its promotion by scientific bodies or societies; also the means afforded for its cultivation among adults, by means of museums, botanical and zoölogical gardens, public lectures, evening and other adult classes, public libraries, etc. My inquiry has, as far as possible, ranged over all these subjects; but inasmuch as many of them are voluntary and not state-aided, and therefore not subject to inspection and report, it has been difficult in several instances to get accurate information about them.

There appeared to be two methods of presenting the subject: 1°. To take each means of advancing scientific education separately, and consider what is done in that particular matter by each colony; 2°. To take each colony separately, and give a general view of its various methods of promoting education in science. After careful consideration, I decided to adopt the second alternative, since comparisons — proverbially odious, and sometimes based on data not strictly comparable — would thereby be avoided.

This is scarcely the time or place to dilate upon the advantages to be gained by giving science a proper place in education; i.e., recognizing that it is of equal value to literature and art as an educational instrument: your presence here to-day proves that you have more or less sympathy with such proposals. To those, however, whose sympathy is *less* rather than *more*, I would commend a careful perusal of three Cantor lectures on science-teaching, recently delivered at the Society of arts (and since published separately) by Prof. Frederick Guthrie of the Science schools, South Kensington, whose powerful arguments, and clear, incisive style, can scarcely fail to make a decided impression upon unprejudiced minds. I wish that time permitted me to quote some of his amusing remarks.

In reviewing the whole subject, I have been very much struck with the fact, that, in every colony, education is a distinct department of the state, under a responsible minister of public instruction, the teachers themselves being in many instances civil servants. The advantages of this plan, enabling the minister, as it does, to take a broad and statesmanlike view of the whole subject, are well seen in a speech on public education in New Zealand, delivered on July 21, 1885, in the house of representatives, by the Hon. Robert Stout, minister of education. This case may be considered a typical one, and will be alluded to again in the detailed account of that colony.

Another noteworthy point is the obvious desire, on the part of nearly every colony, to realize Professor Huxley's aspiration[1] for Great Britain, that the state should provide "a ladder reaching from the gutter to the university, along which every child in the three kingdoms shall have the chance of climbing so far as he is fit to go." In most colonies, not even excepting South Africa, this appears to be more or less the case. A state-aided system of scholarships enables a boy in the primary schools to pass through the secondary and high schools, colleges, etc., and finally to study at the Colonial university. Sometimes the same system is so far extended that holders of such scholarships proceed to England, and take university degrees there, frequently in science.

I propose to consider the provisions for education in science in the following order, in each colony, and to take the colonies themselves in geographical succession, beginning with the most westerly: primary, secondary, and high schools; colleges, both special and general; universities, museums, libraries, scientific societies, lectures, and other means of encouraging a knowledge of science among adults.

Canada.

Province of Ontario (including Ottawa City). — In the public or primary schools, with the exception of a little descriptive geography and very simple object-lessons, no elements of science are taught. The high-school course, however, includes elementary physics and botany, even in its lowest classes. The course of study for all teachers, however, embraces the elements of natural science; and the Normal school at Toronto has, as Dr. Gladstone and I can personally testify, a magnificent collection of apparatus for the teaching of physical and other branches of science, a selection from which can be seen in the Canadian court, educational division. Various denominational colleges teach science to a limited extent; but the chief provision for higher instruction therein is to be found at University college, Toronto, where are three well-equipped laboratories, — chemical, physical, and biological, — the apparatus alone in which cost $27,500, and also three museums. In the School of practical science, connected with this, upon which $50,000 were expended, there are three courses of study, — engineering (civil and mining), assaying and mining geology, analytical and applied chemistry. The Agricultural college at Guelph has a reputation over the whole continent, and natural science is a large feature in its programme. Nearly a quarter of a million dollars were expended on its establishment, and the current annual expenditure exceeds $52,000.

For persons beyond the ordinary school age, there is an excellent organization throughout the

[1] *Fortnightly review*, January, 1878.

province, of the same character as that of the science and art department in South Kensington. Dr. S. Passmore May, the superintendent of mechanics' institutes, who takes the greatest interest in this movement, informs me that no less than sixty branch schools have been established within the last four years, in connection with these institutes. Its headquarters is in the Educational museum in Toronto. Here also is located the famous magnetical and meteorological observatory, established in 1841. The Canadian institute in Toronto, and various societies, more or less scientific in their aim, do good work in encouraging a taste for such studies.

Province of Quebec (including the city of Montreal). — Here the Council of public instruction contains two committees, a Catholic and a Protestant. The educational as well as other organizations are necessarily very often duplicated; but M. Ouimet, the superintendent of the department of public instruction, to whose courtesy I am indebted for much valuable information, informs me that the system has worked well, and without the least friction.

In the primary schools the instruction is almost entirely literary, with the exception of a little geography. Object-lessons, in the English sense of the term, appear to be conspicuous by their absence. A small manual of agriculture is used as a reading-book, but the subject itself is not taught: the idea is to show how to preserve the fertility of the soil. The secondary schools correspond to the French *lycées*, and in their courses chemistry and one or two other branches of science find a place. In the normal schools, also, scientific subjects form part of the training. Perhaps the most important recognition of the proper position of science in an educational course is to be found in the fact, that for the entrance examination to *all* the professions, without any exception, some knowledge of certain branches of science is compulsory. The Laval university at Quebec, for Catholics, and the McGill university of Montreal (of which Sir William Dawson, president-elect of the British association, is principal), both grant degrees in science; and in the latter there is a separate faculty of applied science, which provides a three or four years' professional training in civil, mechanical, and mining engineering, assaying, and practical chemistry, and grants degrees in these subjects. An excellent medical school and faculty of medicine is attached to the university also. The Catholic commercial academy of Montreal, conducted by the Christian Brothers, has a scientific and industrial course similar to that in McGill university; and the Quebec commercial academy, also conducted by the same body, has fairly equipped laboratories, and gives regular courses in science. The normal schools of the province are in each case affiliated to their respective universities. In connection with McGill university, we come across, for the first time, the progressive system of scholarships, reaching down from it to the primary schools; and here should be mentioned the Redpath museum in the university grounds, which is purely scientific in its aims. Except in connection with McGill university, there appear to be no scientific societies. The newly established Royal society of Canada, which draws its members from all parts of the colony, is formed somewhat on the same lines as the French académie des sciences.

New Brunswick. — It is somewhat remarkable that a small colony, mainly agricultural, should possess one of the most perfect systems of instruction in primary schools with which I am acquainted. As early as 1802, the provincial government and legislature recognized the fact that to make provision for the people's education was one of the duties of the state. "From the small beginning then made, there has been developed, by slow degrees, the present public-school system of New Brunswick, one of the most perfect, in principle at least, to be found in any state or country." There is a progressive course of instruction for all schools, in which the subjects appear to have been selected, arranged, and apportioned with a due regard for sound educational principles. It is arranged in two equal divisions, literature and science. Between the bottom of the primary and the top of the high schools there are eleven standards; and yet, even in standard I., in primary schools, plant and animal life, minerals, and geography are among the subjects dealt with, as well as familiar lessons on the conditions of health. Elementary physics makes its first appearance at standard V. Out of a total population, including adults, of 321,000, one-eighth, or 40,000 children, had lessons in hygiene, one-sixth in geography, and one-sixth in useful knowledge of plants, animals, and minerals, in the public schools in 1885. The province spends annually nearly one-third of its total revenue upon education. If local rates be taken into account, the expenditure on the common-school system alone is about £100,000, and this with a total population less than that of Birmingham. The normal school for training teachers was begun in 1847, and the spirit which now animates it may be judged from the following maxim enforced there: "The development of the faculties is of more importance than the acquisition of knowledge." It is in connection with the university at Fredericton, the degrees of which are universally recognized. There is a large

system of scholarships and bursaries in connection with it. A good natural history society exists in St. John, with corresponding members in the country districts. A museum, mechanics' institutes, and similar agencies complete the facilities for the pursuit of science.

Nova Scotia. — In all grades or classes of the elementary schools, the teachers are expected to furnish suitable instruction in hygiene, and what are termed 'Lessons on nature,' or useful knowledge lessons, as well as geography. In grades 3 to 6, these lessons are chiefly biological and mineralogical; while, in grades 7 and 8, elementary physics, chemistry, and agriculture are introduced; and, in order that the teachers may be well prepared for this last, there is a school of agriculture in connection with the normal school. In the higher graded schools, the course includes geography and the elements of mathematics, physics, botany, physiology, geology, and chemistry. There are various colleges, and a university at Halifax, on the basis of that of London, to which most of the colleges are affiliated.

In concluding this brief sketch of the provisions for scientific education in the province of Canada, I feel that it would not be complete without an allusion to the schools for the blind, and for deaf-mutes, all of which come under the superintendents of public instruction, just as they do in the United States. The education of children so afflicted is not a matter of charity, as with us; but it is taken cognizance of officially, and, as I can testify from personal inspection, is carried out in a very scientific manner. What is taught is mainly objective and experimental. It may not be out of place, perhaps, to mention here that we owe the invention of the Bell telephone to researches undertaken by Alex. Graham Bell, in his official position as head of the Normal school for teachers of deaf-mutes, in Boston, Mass., in order to facilitate the instruction of children hitherto voiceless — I can hardly say, speechless.

South Africa.

Cape of Good Hope. — The system is a complete educational ladder, with the Kraal schools at the bottom, and the University of the Cape of Good Hope at the top; and every kind of educational institute is state-aided. I cannot learn that any science-teaching is given in primary schools. In the second-class schools a fairly high standard is aimed at, but how far it is reached may be gathered from the following sentence in a recent report of the inspector-general of schools: "But certainly the greatest want in the school curriculum is the almost general neglect of science-teaching in a scientific manner."

A friend writes to me, "In the schools near Cape Town, of which I had some experience, the idea of science was, getting by rote a few pages of a book on physical geography. At one or two schools, where I introduced simple lessons in physics, with experiments, I was surprised — though it was for this that I hoped — at the quickening of intelligent interest in the work." There is a university, but I regret to say that its examination schemes give no encouragement whatever to scientific training. Public libraries, museums, and botanic gardens exist, and are state-aided, as well as their country branches.

Natal. — A council of education controls state-aided schools of all kinds. The course in all primary schools includes theoretically the elements of natural and physical science. Even in the native schools a little physical geography is taught. In the higher schools, at Durban and Pietermaritzburg, scientific teaching is carried still further. A lady friend of mine, Miss Rowe, an ardent devotee of science, has lately settled in the latter city, at the head of a very high-class girls' school.

Australasian colonies.

In every one of these, the state system of education is compulsory and undenominational. Public instruction is free in Victoria, Queensland, and New Zealand. In proportion to population, Victoria has more children at school than any other colony; but its age-limits, six to fifteen years, are greater. New South Wales heads the list in point of cost of instruction per scholar, with an expenditure of £8 2*s.* 8*d.* each per year, nearly double that of any other colony; but its system of instruction is far the most complete of any, as will shortly be seen.

Western Australia. — Its total population does not amount to 40,000. In 1884 about £10,000 was expended on education. In the schools throughout the colony, whether high or elementary, the rudiments of some branches of science form a part of the teaching. The wealthier classes of society send their children away for education, and this has not tended to encourage high-class teaching of any kind.

South Australia. — The schools are divided into public (or primary) and provisional. In the former, only certificated teachers are employed. Physical geography, object-lessons, and simple drawing all find a place in the compulsory course. The secondary schools and colleges are mainly denominational, receiving 'grants-in-aid,' and in the programmes of many of them science takes a fair position. The colony enjoys the distinction of being the only one of the mainland provinces of Australasia which possesses an agricultural college: it was opened in 1885, under the management of Professor Custance, formerly of Ciren-

ester, and the course of instruction includes hemistry, geology, botany, mechanics, veterinary ience, forestry, etc. The university has nine rofessors, the chairs being thus roughly classi- d: two literature, five science, one music, one w, in all of which subjects, and in medicine, it as power to confer degrees. The matriculation rogramme contains many optional subjects, and would be possible, but not easy, to pass it with- t any knowledge of science. The bachelor's de- ee in either faculty involves three years' aca- emical study, with an examination at the end of ch, conducted in the best manner, viz., partly the professors, partly by external examiners. his system obtains also in the Universities of ictoria and of New South Wales. The course r science degrees is distinctively good, and well ranged. This university opened its degrees to omen in 1880.

In Adelaide, free popular lectures on scientific bjects are given by the university professors, d are very largely attended. The attendance at e courses on physiology was quite remarkable.

There are one or two scientific bodies or associ- tions, such as the Royal society of South Aus- alia, but they are all more or less connected ith the university.

The system of state scholarships, enabling the lders to pass by successive steps from primary hool to university, is very extensive, and hold- s of the 'South Australian scholarship' pro- ed to English universities every year. The pub- library, museum, and art gallery of South Aus- alia form one state-aided institution, organized ry much on the basis of the typical institution South Kensington. Its work, however, is ainly literary and artistic, and it is affiliated ith the university.

VICTORIA.

In this colony the whole subject of public edu- tion was the subject of a royal commission of quiry, which presented a most valuable report 1878 (mainly the work of Mr. Charles H. Pear- n, M.A.), containing excellent suggestions for e organization of public instruction as a whole. have been unable to learn how far these recom- endations have been carried out, since I have d more difficulty in obtaining recent informa- n about Victoria than in any other case.

In the primary schools, geography is a decided ature, but there are no 'object' or useful owledge lessons. Of 7,000 children who, in 84, paid for tuition in 'extra subjects,' one- rth, or 25 per cent, took science if mathematics included, but only 5.7 per cent if it be excluded. his speaks well for the recognition of mathe- atics as the basis of science. For teachers, however, all certificates above a mere 'certificate of competency' require several subjects, from one-quarter to one-half of which are scientific, and some science is compulsory.

All secondary education is under the control of private persons and proprietary bodies, usually connected with some religious denomination. There are eight exhibitions yearly, of £35 each for six years, enabling the holder to pass from state schools through certain approved grammar-schools and a university course.

As the colony owes much of its prosperity to its mines, it is natural to find two excellent schools of mines, — one at Sandhurst (formerly Bendigo), the focus of reef-mining; the other at Ballarat, the centre of alluvial mining. From a personal inspection of both these, a few years ago, I can speak in the highest terms of their efficiency. On Nov. 29, 1880, I wrote in the visitors' book at Ballarat. "The chief thing apparently required to make the school do even better work than it is doing, is that its pupils should come to it with some elementary knowledge of the principles of physical science, such as ought to form part of the necessary instruction in the higher classes of every state school." I have since experienced the pleasure of being informed that these few words, which were printed and widely circulated in the colony, exercised a most important influence for good upon the school.

Determined not to be behind South Australia, the colony has started an experimental farm, and is building an agricultural college in Melbourne. There is also a capital industrial and technological museum, in connection with which lectures are given.

The University of Melbourne ranks with those of Great Britain. Its magnificent buildings were opened in 1855, and women were admitted in 1880. The matriculation examination embraces fourteen subjects, six of which are scientific (including mathematics); but I regret to say that the university gives no encouragement to the study of science, since a candidate may matriculate without passing in either of these six, and, although there are literary honors lists, there are no science honors lists except in mathematics. Science finds a very subordinate place in the arts degree, and degrees in engineering have lately been instituted. Practically all the teaching of natural science in the university is confined to the medical school, one-third of the total number of degrees granted being medical, and one-half arts, the remainder laws. The Melbourne observatory, the Melbourne botanic gardens, and the Melbourne public library are all well known by repute to Englishmen. The zoölogical garden is only recently set on

foot. Eight scientific or learned societies, headed by the Royal society of Victoria and the Royal medical society, keep alive an interest in various branches of science. The Australian health society, with its free lectures in Melbourne, and branch lectures in various provincial towns, does much practical good among the people, and the same may be said of the mechanics' institutes and public libraries to be found in most cities of this colony.

New South Wales.

Just as New Brunswick and Nova Scotia in the Canadian group of colonies appear to have worked out, theoretically at any rate, the most perfect educational scheme, so, in the Australasian colonies a similar place must be accorded to New South Wales. The whole of the present system, which, as usual, is under a minister of public instruction, dates from the act of 1880, which authorized, as state schools, five classes of schools, the recognition of four of which by the state was quite a new thing. These are, 1°, primary; 2°, superior public schools, for additional instruction in the higher branches; 3°, evening schools, for those who had no opportunity for education in primary schools; 4°, high schools for boys, which prepare for the university; 5°, similar schools for girls. In 1885 there were 605 pupils in these high schools, from a colonial population of 920,000. The gross annual expenditure of this act exceeds £700,000; and the total school population is 280,000, or approaching one-third the entire population of the colony.

In every public school, object-lessons, geography, and drawing are taught, even in the lowest classes. In the fourth class of primary schools, object-lessons include "natural history, manufactures, elementary mechanics, and the science of common things;" in the fifth class, "arts and manufactures, the laws of health, social economy, the duties of a citizen, the laws of the state, and experimental physics." Of course, the whole of this is treated in very elementary fashion; but the point to be observed is, that the same idea is carried out in the higher schools, of which I have already spoken. In the Sydney grammar-school, a school *sui generis*, there is now a modern side, in which natural science takes a prominent place. The university is now exceedingly well organized. It grants a B.Sc. and a D.Sc. degree, the latter requiring a research paper. It also grants corresponding degrees in engineering. Its degrees in arts involve attendance upon certain courses of lectures in natural science. I regret, however, to say that its matriculation examination can, if desired, be passed in literary subjects and mathematics alone, to the exclusion of science, which, as is well known, cannot be done in the Univers of London. The public examinations, howeve set on foot to test the education in schools, inclu a large number of science subjects. In conn tion with the university are several denomin tional colleges; and a large and well-endow new medical school has just been built in the u versity grounds.

The most remarkable feature, however, in t public instruction of this colony, is the state sy tem of technical education. The subject was b ing discussed when I was there in 1880, and remember being invited by Sir W. Manning a Sir Harry Parkes to address a meeting about in Sydney. Since then it has made extraordina strides, mainly under the guidance of Mr. Edwa Combes, the president of its board of governo It has followed the principles laid down by t city and guilds of London institute, and arran ments are in progress by which its work will n be tested by the examiners of that body. T Sydney college has 50 classes, in 13 departmen and itinerant lecturers give instruction in 16 the principal towns of the colony. The numb of individual students in Sydney alone last y was 2,634, or more than at the technical institu in Finsbury; and of these, 500 were women. that year, also, 196 popular lectures were gi in Sydney, entirely on scientific subjects, at wh the average attendance was 208, the total be 40,767. In this exhibition are specimens of work of the college. One remarkable feature it has yet to be noticed: all this excellent w has been done in temporary and hired buildin the college has actually no permanent abode.

Among the other means for spreading a kno edge of science, the magnificent museum, the quisitely beautiful botanical gardens, the pu libraries, the Royal society of New South Wa the Linnean society, and similar smaller organ tions, must not be forgotten.

Queensland.

The primary schools are divided into 'st and 'provisional.' There are 425 of the for and the free course of instruction includes g raphy, object-lessons, and elementary mechan Instruction in other subjects is charged for, must be given out of the ordinary school-ho The object-lessons are defined to include "an mentary knowledge of the science of com things — of the materials and processes nece to produce the most common manufactured p ucts — and of the laws of health." In there were 52 scholarships from primary to g mar schools, and these again are largely aide government grants, £90,000 having been spent to the end of 1884. From these sch

ce 1878, three exhibitions to the universities ve been granted yearly, on the result of examtions conducted by the professors in Sydney. he holders of these scholarships have proceeded the Universities of Sydney, Melbourne, London, xford, Glasgow, and Edinburgh, and in many ses have distinguished themselves there, often scientific examinations.

Tasmania.

Little or no elementary science is taught in the imary schools. A council of education takes gnizance of all secondary schools, and conducts aminations for scholarships and exhibitions, d for the degree of A.A. Holders of this dee can proceed to England to study for three rs at government expense: 274 students have ailed themselves of this, and have taken medal and legal degrees, and entered the church, t none have studied and applied their science the colony. It is one of the duties of the anytical chemist to the government, to deliver e public scientific lectures in Hobart. The vernment has under consideration a scheme for troducing technical education into primary hools.

New Zealand.

I have already referred to the speech of the inister of education of this colony, delivered in e house of representatives in 1885. In general aracteristics, the educational system here much sembles those we have been considering. The tent to which science is recognized in the priary schools will be seen from the following cts. With a population of about half a million, ere are nearly 1,000 primary schools, in which most 100,000 children received instruction in 84: 55 per cent of these learned geography; 60 r cent, drawing; 75 per cent were taught 'object-lessons;' and 26 per cent received lessons in ementary science. The course of instruction in is interested me much, as it is so obviously based on what has been so successfully worked in the ard schools of Liverpool, Birmingham, Leeds, ottingham, etc., and is being introduced in Lonn also. It is confined to pupils in and above andard IV.; the boys being taught elementary ysics, or agricultural chemistry, or botany, and e girls domestic economy, based on such excelnt little books as that of Mrs. Buckton. The ripatetic system of teaching these subjects, so ell worked in our large cities, cannot, of course, carried out in New Zealand. The Maori native hools are, on the whole, in a flourishing position, d doing excellent work: 2,226 children are in tendance, and a text-book, 'Health for the aori,' has been published in English and in the rnacular.

In the secondary schools, academical traditions are still very strong, and in the position of science there is very great room for improvement. Under the guidance of the University of New Zealand, however, the provincial colleges affiliated to it are doing much to encourage the pursuit of science. In Canterbury college, out of six professors, four are scientific, and a similar proportion holds good in the so-called University of Otago, excluding the medical school. I believe a similar state of things exists also in the Auckland college. The University of New Zealand recognizes the claims of science to a greater extent, I think, than does any colonial university. The pass for a bachelor of science is as follows: mathematics, physics, chemistry, biology, and any two out of the five following subjects,—Latin, Greek, English, modern languages, mental science. A candidate can matriculate and proceed to the B.Sc. degree without any more classical knowledge than a trifling amount of Latin, such as the proverbial schoolboy ought to have at his fingers' ends. So anxious is the senate of the university to maintain a high standard for its degrees, that all the degree examination questions are set, and all the answers thereto are revised, by English examiners of either London, Oxford, or Cambridge universities. It is my privilege to be the agent of the university in England, and I am now seeing through the press about ninety examination papers for use in the colony next autumn. Mr. Stout says in his speech, that, "considering her population, New Zealand has as many students receiving a university education as any country in the world, and, relatively to her population, more university-trained men than any country in the world."

So much for the scholastic instruction. In the other great means of educating the people, museums, etc., New Zealand is in advance of the other Australasian colonies. The Canterbury museum, whose curator, Dr. Von Haast, is executive commissioner at this exhibition, excels those of Sydney and Melbourne; and in arrangement of exhibits for scientific purposes, the Otago museum is said to be second to none in the southern hemisphere. Those in Wellington and Auckland have also a well-deserved reputation.

General conclusions.

Finally, I beg to offer a few general remarks and conclusions, founded upon the details which we have been considering. To those of us who are familiar with the very limited extent to which the teaching of science is carried out in the elementary schools of Great Britain, it would appear that its claims to a place in state-aided primary education are much more recognized in the colonies than in the mother-country; and this not merely

because it is the only foundation upon which a system of technological education can be securely built, but for its value in drawing out the minds of the pupils.

In secondary, grammar, and high schools, however, where the academic influence and traditions are still strong, I incline to think that science scarcely occupies a position equal to that now attained in corresponding English schools. I should doubt, for example, whether there is any large high-class school in either of the colonies, where, as in Clifton college, a certain amount of attendance on science classes is required from every boy, no matter what his future is to be, in order that he may comprehend the meaning of scientific method and treatment of a subject. The colonial universities, too, though now generally modelled more or less on that of London, have usually so arranged their matriculation examination, unlike their prototype, that it is possible to pass it in purely literary subjects alone.

A glance through the calendars of the older colonial universities shows again, in a very marked degree, the strong influence of the older academic ideas of Cambridge and Oxford. I noticed this particularly in the case of Sydney, in 1880, where I had unusual opportunities of forming an opinion; and also, at the same time, in some of the provincial colleges in New Zealand. Within the last few years, however, a great change has come over colonial university opinion in this matter. Degrees in science have been instituted; faculties of science have been organized, and placed on an equal footing with those of arts, laws, and medicine. In the case of two, at least, of these universities, degrees in engineering science are now conferred, a proposal to establish which, as some present are aware, is now before the University of London.

Great as has been the progress of public opinion in England during the last few years, on the value of science as an element in education, I am disposed to think that the progress has been greater in the colonies in the same period. Certainly the development of that opinion to its present point has been much more rapid in the colonies than at home. In educational as well as in political matters the colonies are most valuable to the mother-country as localities where experiments in legislation may be, and often are, conveniently tried, the progress of opinion on certain subjects there being in advance of that in England.

To attempt a general review of all the other existing agencies for the promotion of a taste for science among adults would be almost hopeless. They are of the same general character as in England, modified to suit the special circumstances of each case; some of them being carried on, under circumstances of great difficulty and discouragement, by enthusiastic devotees of nature, while others, like the Royal societies of Canada, Victoria and New South Wales, have achieved a reputation which extends wherever the English language is read.

EDUCATION IN SPAIN.

An English writer, touching on the subject of education in Spain, complains that so different are the conditions in the various provinces of Spain, statistics mislead when they seem to show that Spain is one of the worst educated countries in Europe. While this is true, he says, of many districts, it is not true in all. The great drawback to the cause of education in Spain is the comparatively small educated public to which appeal can be made. Out of upward of sixteen millions of Spaniards, only four millions know how to read and write, and half a million more can read only. Thus only about twenty-five per cent of the population have any education worth speaking of.

Then, too, a corrupt and corrupting political and administrative influence is brought to bear on education. Nominally, and according to the letter of the law, education is compulsory on all Spaniards between the ages of six and nine. Yet the number of pupils on the school rolls is only 1,800,000, and the actual attendance is less than sixty per cent of the enrolment. The laws are violated in many particulars and neglected or evaded in many more. Of the 23,000 schoolhouses (and it must be remembered that the most of these escape inspection altogether), 7,999 are returned as *no decentes y capaces*.

The teachers' salaries are ludicrously small. Of 15,000 teachers, 1,273 receive less than twenty-five dollars a year, 2,827 receive from twenty-five to fifty dollars, and only half of them have a salary that amounts to one hundred dollars.

Between 1870 and 1880 some progress was perceptible in educational matters. The northern provinces are in advance of those of the south. Alava comes first, with sixty-three per cent of the male population able to read and write. The religious orders and corporations do not play as large a part in the education in Spain as is commonly supposed. In the matter of primary education, the whole number of pupils taught by the religious associations is only 30,879, while the returns from the Protestant schools show only 3,[illegible] enrolled in them.

The chief trouble with Spanish education seems to be that it does not conform to the real needs of the nation. While seventy-five per cent of the total population can neither read nor write, the proportion of university graduates is as high as that

France and Germany. The needs of Spanish education would therefore seem to be, first, vigorous and honest enforcement of the laws as they stand at present; and, secondly, some means of extending primary instruction.

COLLAR'S LATIN BOOK.

THIS book is an outcome of the discussions of the past few years on the value of classical study. Its method is a complete change from the tedious study of grammar to a rational view of the language as a form of expression. Its aim, as stated in the preface, "is to serve as a preparation for reading, writing, and, to a less degree, for speaking Latin." This preparation it gives, not by getting the Latin language before the beginner as a collection of paradigms and rules of syntax, but as a vehicle of ideas. It is here that the book breaks away from the traditional method.

Immediately on opening it, one notices the absence of any reference to the grammars. The book is not, as so many are, a mere guide-post, telling the pupil where in the grammars he can find forms, rules, or exceptions. In a compact form it gives all necessary paradigms and rules, but with full and repeated illustration. The examples are chosen not merely to illustrate forms and rules, but to show that forms and rules are instrumental to expression, and that it is as possible for a boy to express his own ideas in Latin as it is to find out what some one else has expressed. Further aid in this direction is given by the arrangement which brings the verb near the beginning, before the completion of declension, enabling the pupil to construct sentences, and by inserting early in the vocabularies verbal forms. Thus a boy learns that *habet* means 'has' before he can conjugate, just as a child learns 'has' before he knows it is a part of 'to have.' By slight changes of meanings, the exercises and vocabularies are made suggestive, and the *colloquia* scattered through the book cannot fail to interest and stimulate to imitation.

The plan of the book rests upon the fact that the memory and not the judgment of the pupil is to be exercised; that one can learn facts rapidly who cannot appreciate reasons. The unslaked thirst of memory that belongs to the age when Latin is usually begun is made use of, but is not quenched by a mass of unnecessary detail and unimportant exceptions. Explanations are omitted, except as they help the pupil to understand, not the theory of constructions, but their uses. The omissions of the book are noteworthy, and the editors have happily avoided the deplorable error "of failing to discriminate between the relatively important and unimportant." The subjunctive mood, that slough of despond for beginners, is treated briefly but clearly, and fully enough for such a book.

The chapter on derivation does not seem quite up to the general level of the book. The examples are apt and well grouped, but they will be taken as individual specimens rather than illustrations of principles. In other chapters, after the examples, the rule or principle covering them has been stated, and in this it would have been well to add statements of the meaning attached to certain terminations.

The book is a *live* one. No lazy teacher can use it with success. It gives suggestions, but requires attention, and, properly used, will fulfil the expectation of the editors that pupils can be prepared by it for Caesar within a year. It will meet with success, because it throws off the trammels of artificial methods, and seeks those that are rational and natural.

JOHN K. LORD.

The beginner's Latin book. By WILLIAM C. COLLAR and M. GRANT DANIELL. Boston, *Ginn*, 1886. 12°.

MONOGRAPHS ON EDUCATION.

THE publishers of this handy series of essays are doing an excellent work. As they state in their preface, "many contributions to the theory or the practice of teaching are yearly lost to the profession, because they are embodied in articles which are too long, or too profound, or too limited as to number of interested readers, for popular magazine articles, and yet not sufficient in volume for books." Every teacher knows how true this statement is, and should therefore welcome such contributions to pedagogics when presented in so attractive a form as that in which these monographs are issued.

Prof. Stanley Hall's monograph on reading[1] is an example of applied pedagogics. He outlines the various traditional methods of teaching children to read, and also some of those suggested by the psychologists, and reaches the eminently sensible conclusion that "there is no one and only orthodox way of teaching and learning this greatest and hardest of all the arts." We cannot believe, however, that Professor Hall means to be taken seriously when he says (pp. 17, 18) that "many of our youth will develop into better health, stancher virtue, and possibly better citizenship, and a culture in every way more pedagogical and solid, had they never been taught to read, but some useful handicraft, and the habit of utilizing all the methods of oral education within reach, instead. . . . The school has no right to teach how to read, without doing much more than

[1] *How to teach reading, and what to read in school.* By G. STANLEY HALL. Boston, *Heath*, 1886. 12°.

it now does to direct the taste and confirm the habit of reading what is good rather than what is bad." Of course, the school tries to form good habits, if it forms any at all, both of reading and of every thing else that falls within its scope, but we cannot admit for an instant that the school is responsible for the abuse of any power that it puts in the hands of its pupils. Moreover, while what Professor Hall says about men having gotten on pretty well before Gutenberg, and even before Cadmus (p. 17), is all true enough, yet it does not bear on the argument. The point is, that they would not get on at all now, unless they harmonized with the nineteenth-century environment; and of that the ability to read is an important part. However, we hardly think Professor Hall meant to be taken seriously, but was emphasizing what we all deplore, — the time wasted in reading useless and often positively harmful literature.

The remaining monograph that we have received is on the study of Latin, by Professor Morris of Williams college.[1]

It is a very good presentation of one side of the subject, based on the important distinction that the 'study of a language' is ambiguous, unless we know whether by it is meant the acquisition of the language for reading or speaking, the study of the literature written in it, the study of a language with a view to using it effectually in composition, or the investigation of the language itself as an organic growth.

HALL'S BIBLIOGRAPHY OF EDUCATION.

With the rapid development of the science of education there has grown up an increasingly voluminous and complex mass of pedagogical literature. Educational journals almost without number have been founded, and histories, criticisms, and constructive works dealing with educational subjects, have followed each other in bewildering succession. To all this literature a guide is necessary: the useful must be sifted from the useless, and some classification for the purpose of systematic study must be adopted. An attempt has been made to do all this by Prof. Stanley Hall and Mr. John M. Mansfield in the little volume before us.

The cautious wording of the title and the frank confessions of the preface disarm all serious criticism, and lead us to be thankful for what we have received, instead of complaining because of what we miss. It cannot be denied that the classification adopted is superficial and provisional,—it is the outgrowth of a series of topical reference-lists used by Professor Hall in connection with his lectures at the Johns Hopkins university,—and that typographical and minor errors are very numerous in the book; but the work is so comprehensive, and the result of such painstaking labor, that it will be found of great value to every student and reader in the broad field of pedagogics. In fact, because of its suggestiveness alone, it may fairly be said to be indispensable to every pedagogical library that pretends to be complete and abreast of the times.

The references in some departments are much fuller than those in others,— the result, we fancy, of the fact that many hands have co-operated in the production of the book; and the list of educational periodicals, while it names the best journals, is scanty. The volume will, however, give to many persons an idea of the scope and complexity of educational science that they have never before possessed, and we trust that it may have a cordial reception and an extensive use. A second edition will undoubtedly remedy many of the blemishes of the first, and will, we hope, afford an opportunity for adding to the editorial notes appended to the references, which are of great value.

PAINTER'S HISTORY OF EDUCATION.

This book calls for neither extended notice nor searching criticism. It is modest, compact, and satisfactory. In no sense is it an original work, but it shows good sense in the selection of material, and good judgment in its arrangement. We could wish that it had been more original in one or two particulars; for example, in its treatment of the universities. Compayré and most of the German manuals of the history of education touch too lightly on this great subject. We believe that due acknowledgment is rarely made of the great intellectual stimulus the western world received from the great universities. Professor Painter follows in the beaten path here, and says but little on the subject. Moreover, it seems fitting that a book having a chapter entitled 'Education in the nineteenth century' should say something of the great movement in the direction of manual training, industrial and technical education, that has manifested itself in Europe and America. Professor Painter has passed this by. Yet the book is a useful one, and it will find many readers among those educators who are striving to put their work in the line of historical and logical development from that of the great masters of education who have preceded them.

[1] *The study of Latin in the preparatory course.* By E. P. Morris. Boston, *Heath*, 1886. 12°.

Hints toward a select and descriptive bibliography of education. By G. Stanley Hall and John M. Mansfield. Boston, *Heath*, 1886. 12°.

A history of education. By F. V. N. Painter. New York, *Appleton*, 1886. 12°.

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Revue internationale de l'enseignement, Oct. 15 — La réforme de l'enseignement supérieure en Italie, par M. Georges Lafaye. — Universités et collèges d'enseignement supérieur aux Etats-Unis, par M. B. Buisson. — Le prêt des livres à l'extérieur par les bibliothèques publiques italiennes, par M. Jules Flammermont. — Chronique de l'enseignement. — Documents. — Nouvelles, etc. — Bibliographie, etc

Revue pedagogique, Sept. 15. — Une matinée dans les écoles de Berne. — Examen pour le certificat d'aptitude au professorat des écoles normales d'institutrices (Juillet, 1886), rapport de M. G Vaperau. — En Algerie, notes de voyage (fin), par M. A. Pressard. — Conference sur l'histoire de l'art et de l'ornament, par M. E. Guillaume.

Revue de l'enseignement secondaire, Sept 15. — Situation des lycées et colléges de la Seine au 1 er Mai, 1886. — L'enseignement secondaire public dans les departements de l'Académie de Paris, la Seine exceptée. — Projet de réforme de l'enseignement secondaire classique, par M. E Hallberg. — Rapport à M. le Ministre sur le concours d'aggrégation de l'enseignement spécial, par M. Edgar Zevort.

Journal of education, October. — On teaching modern history (concluded), by F. W. Cornish. — School life in the Apennines. — Foreign notes. — Correspondence: Rev. R. H. Quick on the training of teachers, etc. — The Bordeaux congress — Free education in the United States. — Notes on teaching English in France. — Reviews, notices, etc.

Journal of education, November. — The cultivation of taste. — The unification of secondary schools in Germany. — A Bernese village school. — Graphic work in school-teaching, by T. H. Eagles. — A debate on corporal punishment. — Technical training for teachers in Switzerland. — Dr. Warner on the physiology of the child. — A cyclopaedia of education. — The teacher's guild of Great Britain and Ireland. — Notes and correspondence. — Foreign notes: Schools and universities. — Reviews, notices, etc.

Educational times, October. — First report of the Royal commission appointed to inquire into the working of the elementary education acts, England and Wales. — International congress on technical education at Bordeaux. — Meeting of the Council of the college of preceptors. — Commercial education. — University education in New Zealand. — Reviews, notes, etc.

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Applications de la psycho-physique, sur les. G. Sorel. *Revue philosophique*, October.

Building-up of a university, the. Rev. Dr. Augustus Jessopp. *Nineteenth century*, November.

[An interesting article on the universities of England, suggested by Willis's "Architectural history of the University of Cambridge and of the colleges of Cambridge and Eton."]

Développement des sens chez l'enfant, d'apres M. Preyer, le. H. de Varigny. *Revue scientifique*, Sept. 25.

[A review of a French translation of Preyer's 'Die seele des kindes.' It concludes "L'étude de ce nouveau-né sera toujours des plus interessantes, et ce ne sera pas le moindre des titres de M. Preyer, que d'avoir montre avec quelle methode et quel soin il la faut faire."]

English literature at the universities. Anon. *Quarterly review*, October.

[This article, though anonymous, is attributed by the critics to Mr. J. Churton Collins. It is a spirited attack on Mr. Edward Gosse and his recently published book, 'From Shakspere to Pope.' Mr. Gosse's rejoinder may be read in the *Athenaeum* of Oct. 23. A notice of the *Quarterly review* article will also be found in the *Spectator*, Oct 30 In the *Athenaeum* for Oct. 30, the *Quarterly* reviewer replies to Mr. Gosse. Mr. Swinburne has also taken part in the controversy, which threatens to become general among the literary men of England.]

Fifteen years of national education in England. Richard Bartram. *Westminster review*, October.

French academy, the. Lady Dilke. *Fortnightly review*, November.

Higher education of woman, the. Mrs. Lynn Linton. *Fortnightly review*, October.

Manual instruction. Sir John Lubbock. *Fortnightly review*, October.

Manual training in school education. Sir Philip Magnus. *Contemporary review*, November.

[Containing some important illustrations of the good effects resulting from the introduction of manual training into the school course.]

Materialism and morality. W. S. Lilly. *Fortnightly review*, November.

Metaphor as a mode of abstraction. Prof. Max Müller. *Fortnightly review*, November.

Mouvement géographique, le. L. Delavaud. *Revue de géographie*, September.

Origine et la destinée de l'art, l'. G. Seailles. *Revue philosophique*, October.

Professor Freeman on the methods of historical study. *Westminster review*, October.

[A favorable review of Professor Freeman's new book.]

Questions d'enseignement; le congrès de Bordeaux. M. Vachon. *La nouvelle revue*, Oct. 15.

Recent educational changes in France, in 'Contemporary life and thought in France.' Gabriel Monod. *Contemporary review*, November.

[A brief statement of the changes recently made in the division known as 'enseignement special.']

Réformes de l'enseignement secondaire, les. C. Bigot. *Revue politique et littéraire*, Oct. 2.

Studi sulla psicologia inglese: Giovanni Locke. Guiseppe Tarantino. *Rivista di filosofia scientifica*, September.

Teacher's handbook of psychology, the. Carveth Read. *Mind*, October.

[A sympathetic review of Mr. Sully's new book.]

Temperance legislation in England and elsewhere. William Cunningham. *Contemporary review*, November.

[An interesting survey of recent temperance legislation and its results. The author quotes largely from the statutes of various states in this country.]

Ueber die wahre aufgabe der physiologie. Prof. W. Preyer. *Deutsche rundschau*, Oct. 1.

Use of higher education to women, the. Millicent Garrett Fawcett. *Contemporary review*, November.

[An address to the students of Bedford college. Mrs. Fawcett criticises the argument of Dr. Withers Moore on this subject in his address before the recent meeting of the British medical association.]

What girls read. E. G. Salmon. *Nineteenth century*, October.

Calendar of Societies.

Connecticut academy of arts and sciences, New Haven.

Nov. 7. — Professor Hastings, Exhibition of rock-salt lenses and prism; Professor Brewer, A finished breed of horses.

Philosophical society, Washington.

Nov. 20. — G. K. Gilbert, Certain new and small mountain ranges (concluded); T. Russell, Normal barometers; N H. Darton, On the occurrence of copper ores in the trias of the eastern United States; J. S. Diller, The latest volcanic eruption in northern California, and its peculiar lava.

Anthropological society, Washington.

Nov. 16. — G. K. Gilbert, The geological date of a prehistoric hearth observed in western New York; J. H. McGee, Remarks on an obsidian spear-head found in a quaternary deposit in Walker cañon, Nevada.

Engineers' club, Philadelphia.

Nov 6. — W. E. Hall, Car lubrication; Frank A. Hill, Accidents in anthracite mines; G. R. Henderson, Efficiency of locomotives and resistance of trains; Herman Haupt, jun., A description of the St. Paul ice-palace.

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Abbott, E. Easy Greek reader. (Clarendon press series.) Oxford, *Clarendon pr.*, 1886. 80+96 p. 16°. (New York, Macmillan, 75 cents.)

Bert, P. First steps in scientific knowledge. Tr. by Madame Paul Bert. Philadelphia, *Lippincott*, 1887. 70+129+91 p., illustr. 16°.

Buckland, A. Our national institutions. London, *Macmillan*, 1886. 6+111 p. 16°.

Challenger, report of the scientific results of the exploring voyage of. Vols. xv., xvi: Zoology. London, *Government*, 1886. 827+700 p., 58+64 pl., 1 chart. 4°.

Clifford, W. K. Lectures and essays. Ed. by Leslie Stephen and Frederick Pollock. 2d ed. London, *Macmillan*, 1886. 443 p., portr., 12°. $2.50.

Doberck, W. The law of storms in the eastern seas. Hongkong, *Hongkong Telegraph*, 1886. 24 p., map. 16°. 50 cents.

Gautier, T. Scenes of travel. Ed. by George Saintsbury. (Clarendon press series.) Oxford, *Clarendon pr.*, 1886. 12+130 p. 16°. (New York, Macmillan, 50 cents.)

Gueroult, G. Esquisse d'une théorie générale des lampes a arc voltaique. Paris, *Gauthier-Villars*, 1886. 43 p. 12°. (New York, Christern, 50 cents.)

Gugau, M. L'irréligion de l'avenir. Paris, *Alcan*, 1887. 478 p. 8°. (New York, Christern, $2.50.)

Halphen, G.-H. Traité des fonctions elliptiques et de leurs applications. Première partie. Paris, *Gauthier-Villars*, 1886. 492 p. 8°. (New York, Christern, $5.)

Harrower, H. D. Captain Glazier and his lake: an inquiry into the history and progress of exploration at the head waters of the Mississippi since the discovery of Lake Itasca. New York, *Ivison, Blakeman, Taylor & Co.*, 1886. 58 p., 10 maps. 8°.

Holbrook, M. L. How to strengthen the memory; or, Natural and scientific methods of never forgetting. New York, *The author*, [1886.] 152 p. 12°.

Jays, L. Problèmes de physique et de chimie. Paris, *Gauthier-Villars*, 1886. 335 p. 8°. (New York, Christern, $2.)

Kapp, G. Electric transmission of energy, and its transformation, subdivision, and distribution. New York, *Van Nostrand*, 1886. 12+331 p., illustr. 12°.

Marshall, A. and M. P. The economics of industry. London, *Macmillan*, 1885. 16+231 p. 16°.

Mason, T. B. The war between Chile and the allied republics of Peru and Bolivia in 1879-81. Washington, *Government*, 1886. 77 p., maps. 8°.

Medical education and medical colleges in the United States and Canada, 1765-1886. Springfield, Ill., *State board of health*, 1886. 172 p. 8°.

Niebuhr's Griechische heroen-geschichten. Tales of Greek heroes. Ed. by Emma S. Buchheim. School edition. (Clarendon press series.) Oxford, *Clarendon pr.*, 1886. 8+131 p. 16°. (New York, Macmillan, 50 cents.)

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—— Same. Vol. xx: Statistics of wages, necessaries of life, trades societies, and strikes and lockouts. Prepared by Jos. D. Weeks. Washington, *Government*, 1886. 635 p. 4°.

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